

# Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report							
RSY Pad: RSY 39 Use 1				Soil Origin: TU-108A SFU			
Data attached and submitted by: Amy Mangel				Data Report Submittal Date: 02/12/2021			

Systematic Soil Sample Data: RSY 39 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU108A-001	1	Systematic	9,418	15,359	0.312	-0.0223	-0.0138
HPPG-SFU-TU108A-002	2	Systematic	9,674	15,359	0.365	0.0116	N/A
HPPG-SFU-TU108A-003	3	Systematic	9,803	15,359	0.487	0.00960	N/A
HPPG-SFU-TU108A-004	4	Systematic	7,923	15,359	0.0240	-0.0261	N/A
HPPG-SFU-TU108A-005	5	Systematic	9,991	15,359	0.326	0.0141	N/A
HPPG-SFU-TU108A-006	6	Systematic	9,926	15,359	0.418	-0.0304	N/A
HPPG-SFU-TU108A-007	7	Systematic	9,904	15,359	0.267	-0.0319	N/A
HPPG-SFU-TU108A-008	8	Systematic	8,773	15,359	0.187	0.0196	N/A
HPPG-SFU-TU108A-009	9	Systematic	9,260	15,359	0.266	0.0209	N/A
HPPG-SFU-TU108A-010	10	Systematic	9,002	15,359	0.0576	0.0303	N/A
HPPG-SFU-TU108A-011	11	Systematic	9,393	15,359	0.219	0.0121	-0.0226
HPPG-SFU-TU108A-012	12	Systematic	9,795	15,359	0.265	0.0245	N/A
HPPG-SFU-TU108A-013	13	Systematic	9,871	15,359	0.279	-0.0342	N/A
HPPG-SFU-TU108A-014	14	Systematic	9,163	15,359	0.314	0.00808	N/A
HPPG-SFU-TU108A-015	15	Systematic	9,415	15,359	0.271	0.0233	N/A
HPPG-SFU-TU108A-016	16	Systematic	8,881	15,359	0.244	0.0107	N/A
HPPG-SFU-TU108A-017	17	Systematic	8,647	15,359	0.322	-0.0410	N/A
HPPG-SFU-TU108A-018	18	Systematic	9,052	15,359	0.286	-0.0222	N/A
HPPG-SFU-TU108A-019	19	Systematic	9,730	15,359	0.324	-0.00498	N/A
HPPG-SFU-TU108A-020	20	Systematic	9,132	15,359	0.250	0.00194	N/A
HPPG-SFU-TU108A-021	21	Systematic	9,382	15,359	0.0543	-0.0217	0.0302
HPPG-SFU-TU108A-022	22	Systematic	8,960	15,359	0.318	-0.0493	N/A
HPPG-SFU-TU108A-023	23	Systematic	9,701	15,359	0.424	0.0196	N/A
HPPG-SFU-TU108A-024	24	Systematic	9,390	15,359	0.367	-0.0334	N/A
HPPG-SFU-TU108A-025	25	Systematic	9,219	15,359	0.228	0.0180	N/A
Soil Systematic Sample Statistics					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
					Maximum	0.487	0.0303
					Mean	0.275	-0.00370
					Median	0.279	0.00810
					Minimum	0.0240	-0.0493
					Standard Deviation	0.11	0.0246

Biased Soil Sample Data: RSY 39 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU108A-B-001	1	Biased	9,889	15,658	0.354	-0.0404	-0.0276

CPM Counts per minute

pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11202020-PG-ROV-329	11/20/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11212020-PG-JSS-333	11/21/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11232020-PG-JSS-339	11/23/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11232020-PG-JSS-337	11/23/2020	3x3	08/06/2021	106853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 39 Use 1
1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 36 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
2) One-minute static follow-up measurements with the RS-700 were collected at 36 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-49. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.
3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 50-85). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for <sup>89</sup> Sr. Strontium-90 results are also included in the TestAmerica sample results report (pages 50-85). Samples HPPG-F-043 and HPPG-F-044 are field duplicates, correlating to systematic samples -014 and -023. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.
Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.
4) In accordance with Final Parcel G Work Plan Section 3.3.1, one biased sample was collected from the location of the highest gross gamma scan measurement, since all follow-up static measurements were below the ROC-specific critical levels. TestAmerica sample results are attached (pages 86-100). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.
<b>Conclusions:</b>  In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.  RSY 39 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-108A SFU.  APTIM requests RASO concurrence to release this soil as Non-LLRW. Disposition: This soil shall be used as backfill for TU-108.

## Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-39-U1					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		1.00	26.05	12.39	12.03	3.59
ROI-06		50.10	127.28	85.11	85.18	10.05
ROI-07		38.08	101.21	66.34	66.14	8.71
ROI-08		73.15	150.30	107.07	107.22	11.47
ROI-10		1,866.77	2,464.33	2,176.50	2,180.52	97.53

Statistical Summary Reference Background

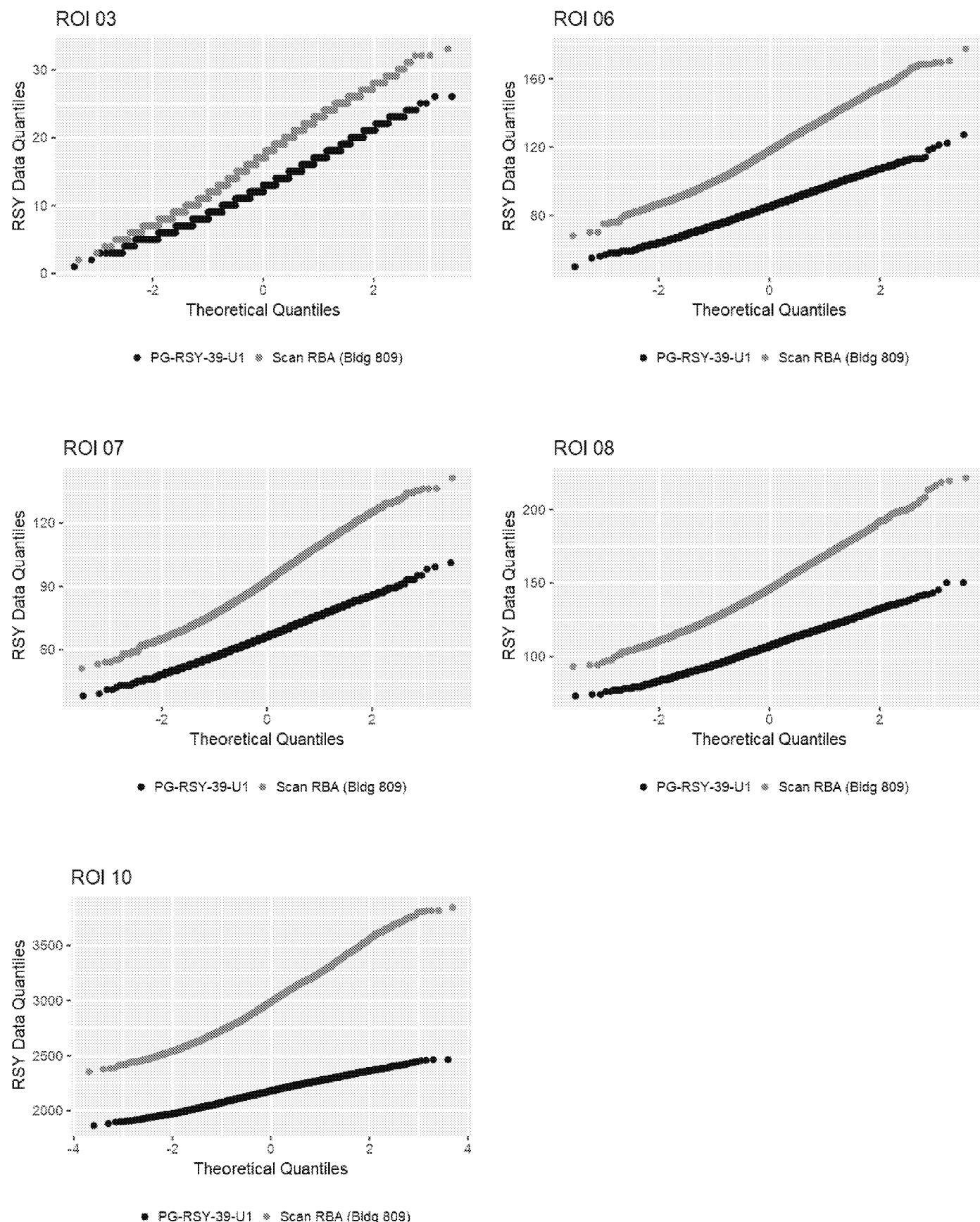
TYPE	Scan RBA (Bldg 809)					
	ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03		2.00	33.08	16.21	16.04	4.13
ROI-06		68.15	177.45	117.58	117.26	15.50
ROI-07		51.11	141.33	92.34	91.24	13.43
ROI-08		93.19	221.48	146.24	145.30	18.21
ROI-10		2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-39-U1	3180
Scan RBA (Bldg 809)	4632

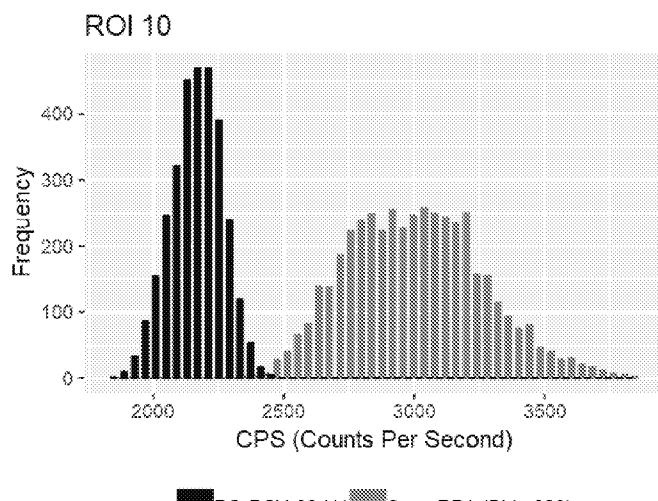
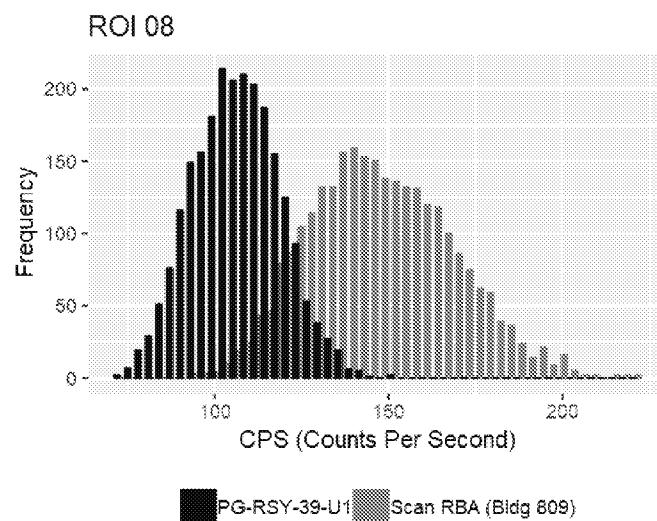
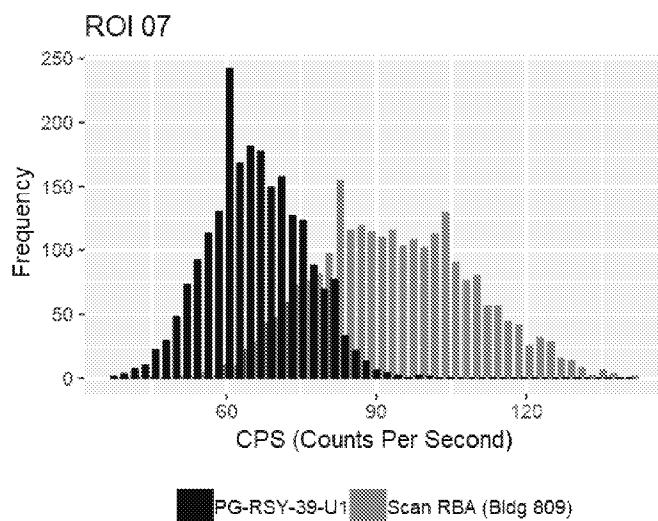
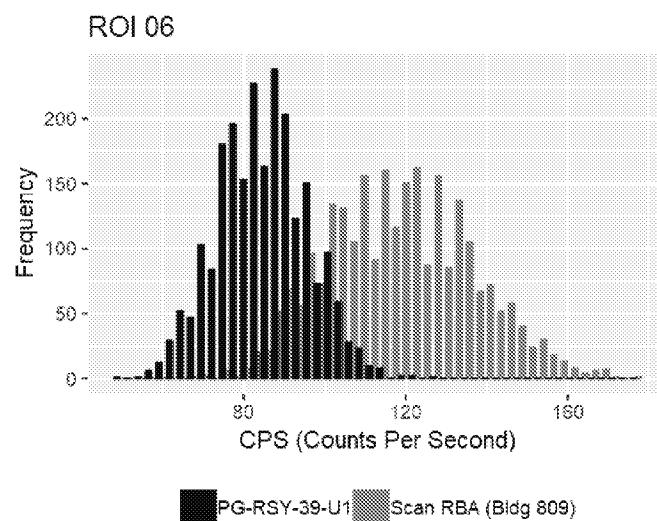
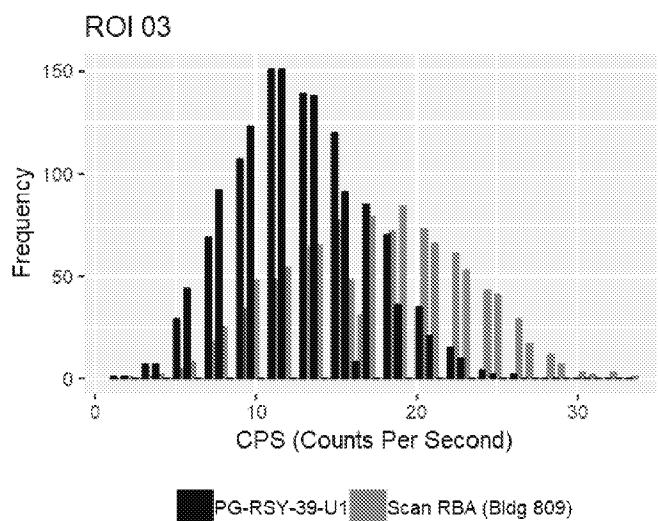
# Soil Scan Statistics

## Normal Q-Q Plots



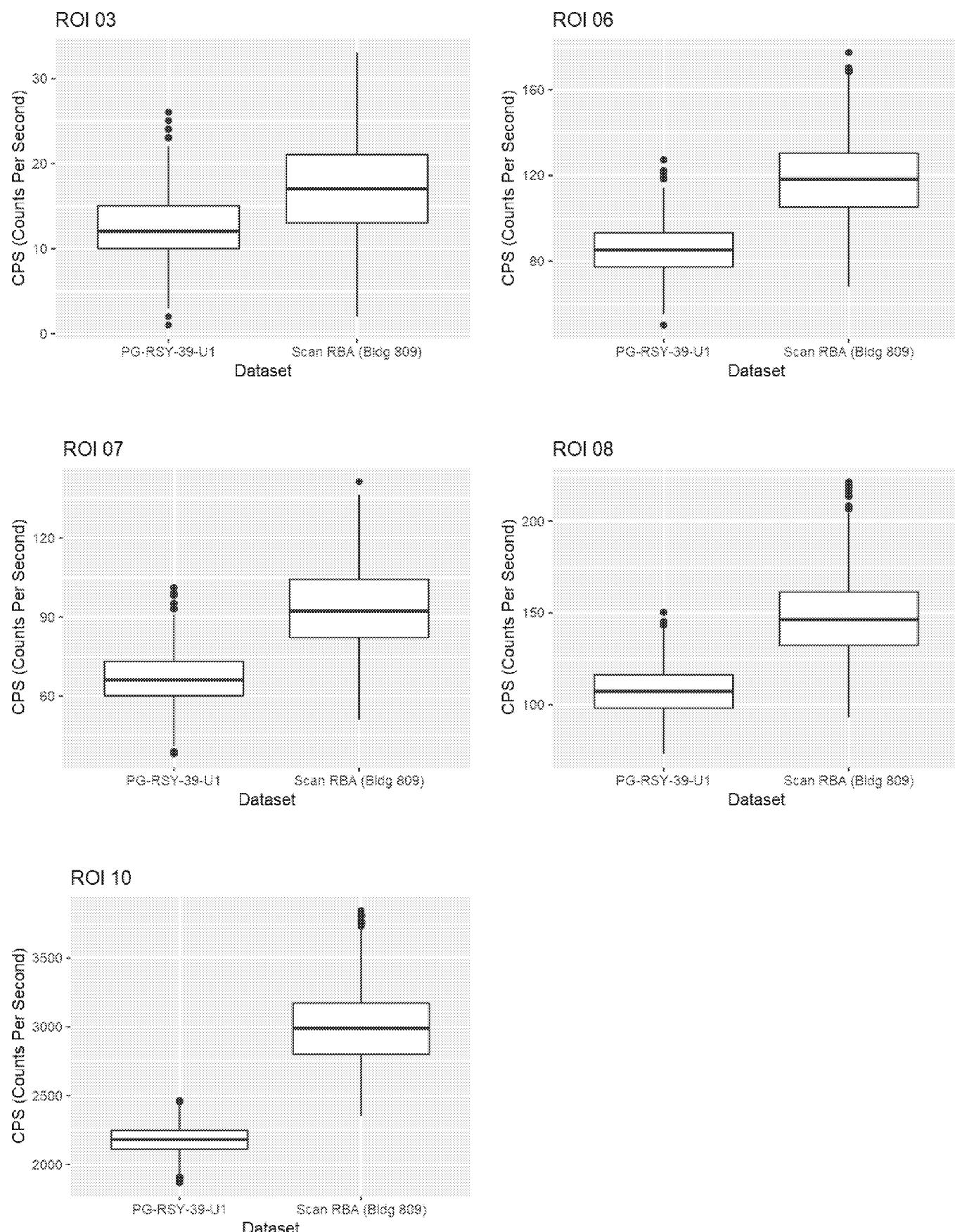
# Soil Scan Statistics

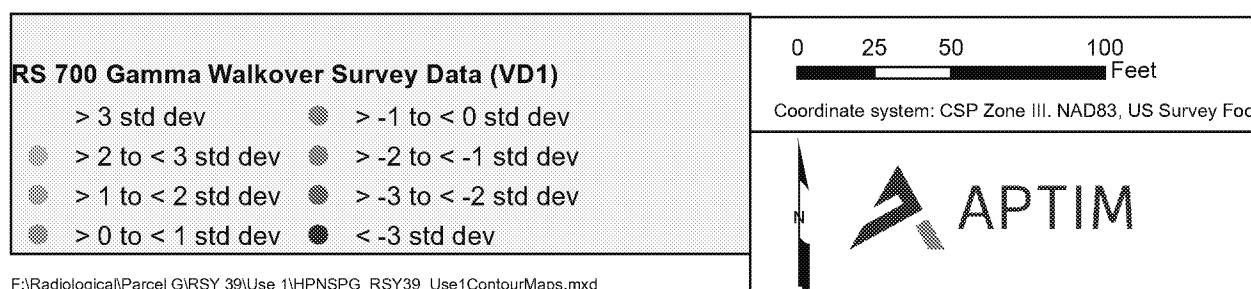
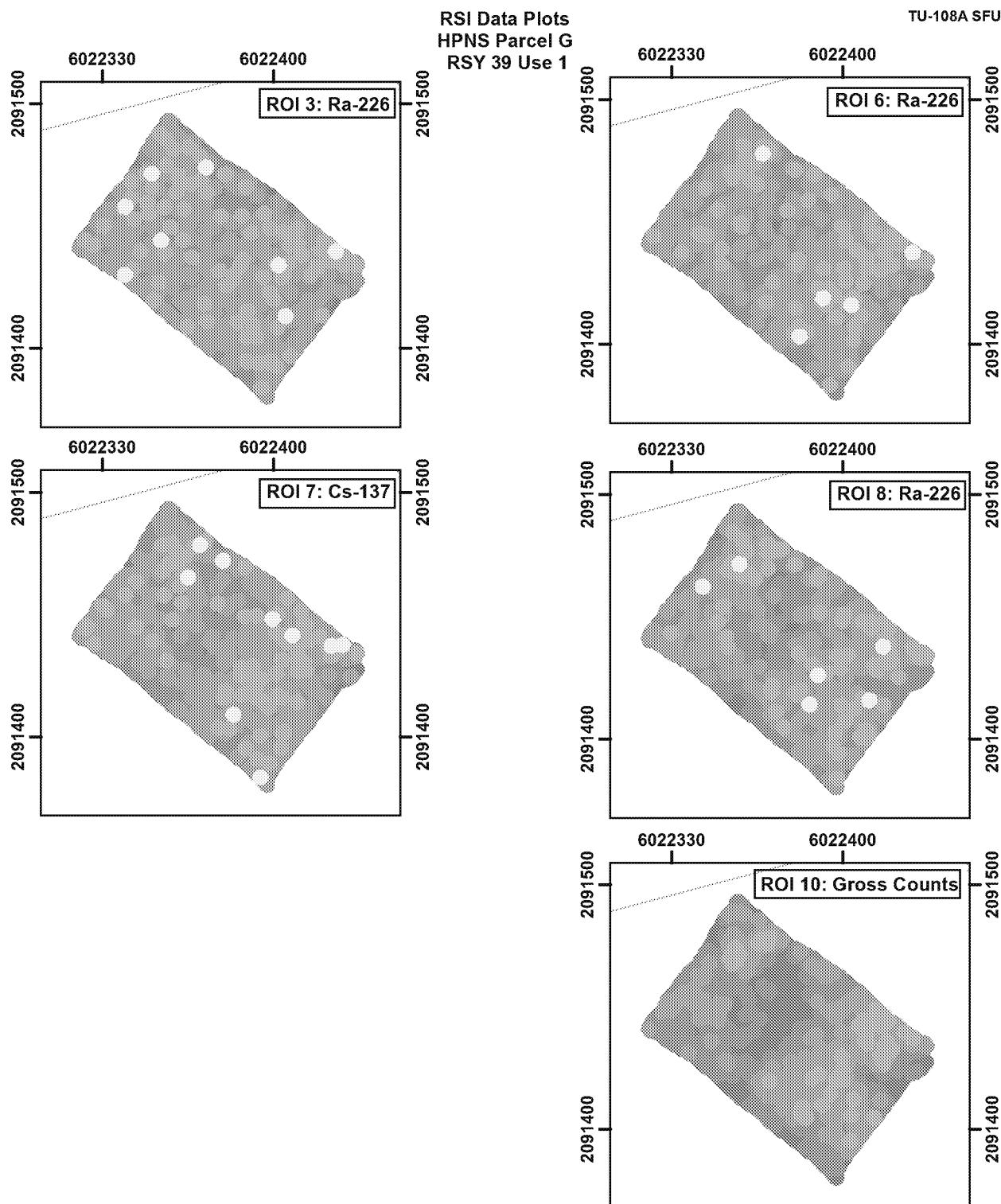
## Histograms

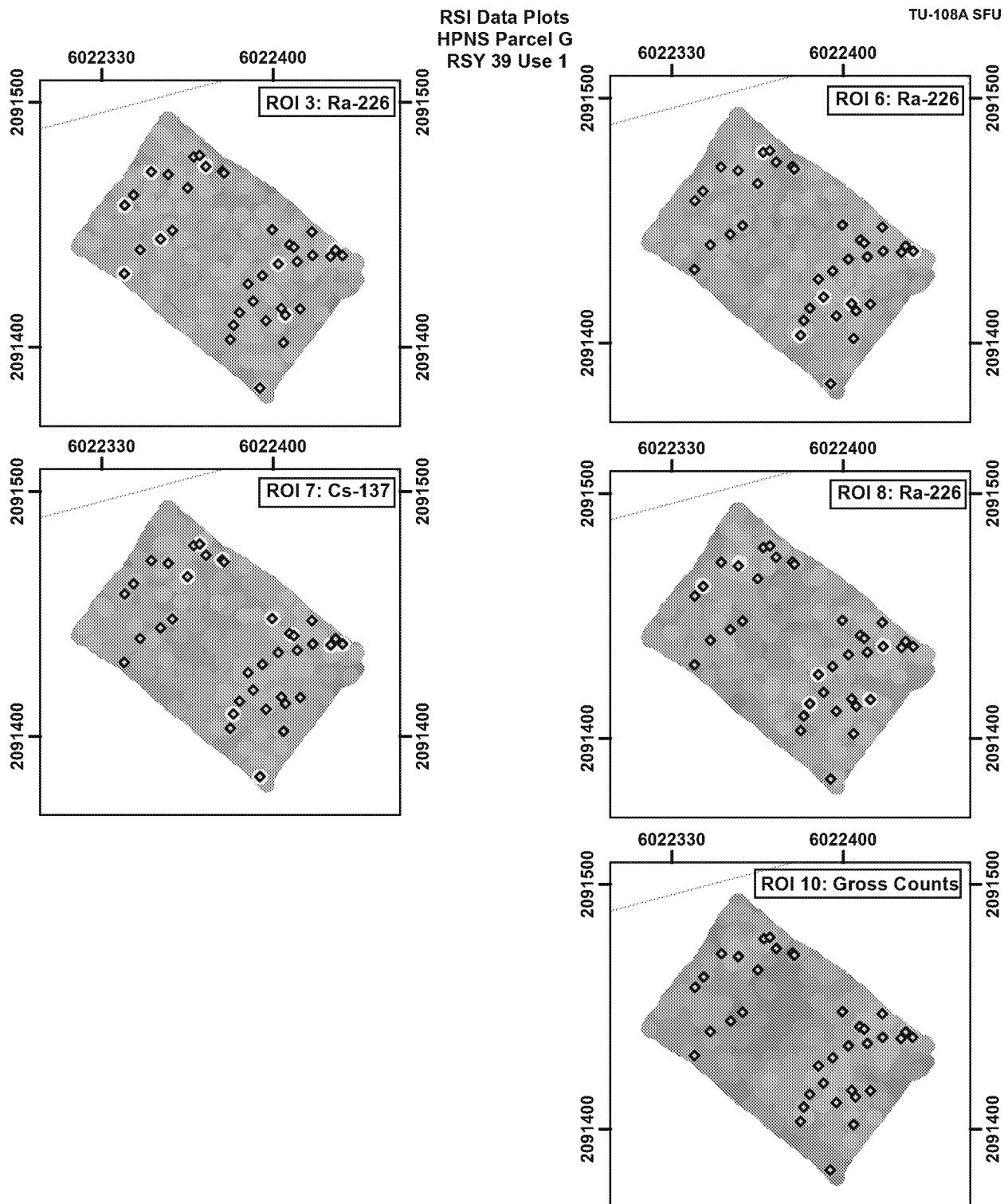


# Soil Scan Statistics

## Box Plots






**RS 700 Gamma Walkover Survey Data (VD1)**

- |                       |                        |
|-----------------------|------------------------|
| ◆ Follow-Up Locations | ● > -1 to < 0 std dev  |
| > 3 std dev           | ● > -2 to < -1 std dev |
| ● > 2 to < 3 std dev  | ● > -3 to < -2 std dev |
| ● > 1 to < 2 std dev  | ● < -3 std dev         |
| ● > 0 to < 1 std dev  |                        |

0 25 50 100 Feet

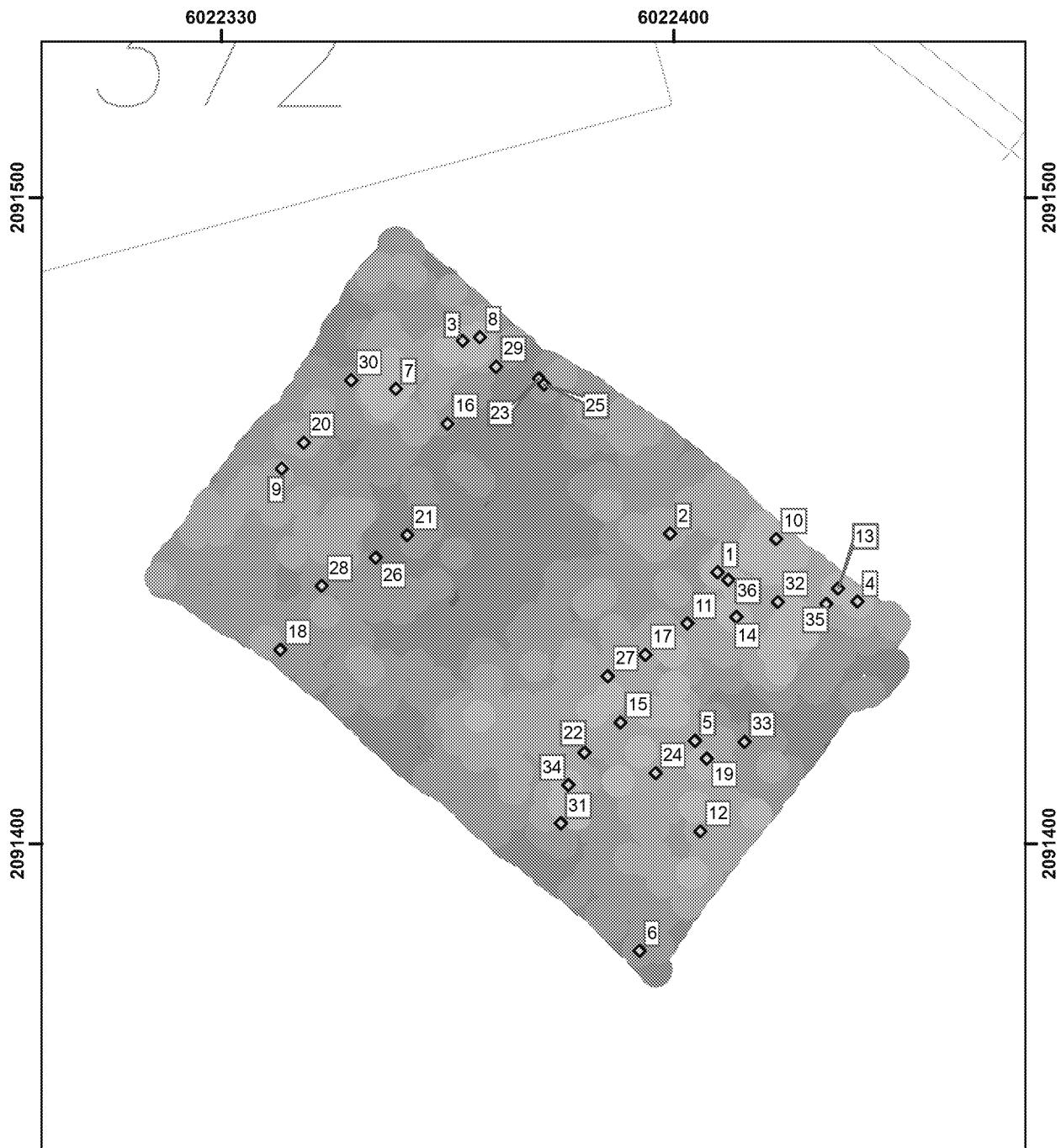
Coordinate system: CSP Zone III, NAD83, US Survey Foot



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**Follow-Up Static Survey  
HPNS Parcel G  
RSY 39 Use 1**

TU-108A SFU



**RSY 39 Use 1 (VD1, ROI 10 Gross Gamma)**

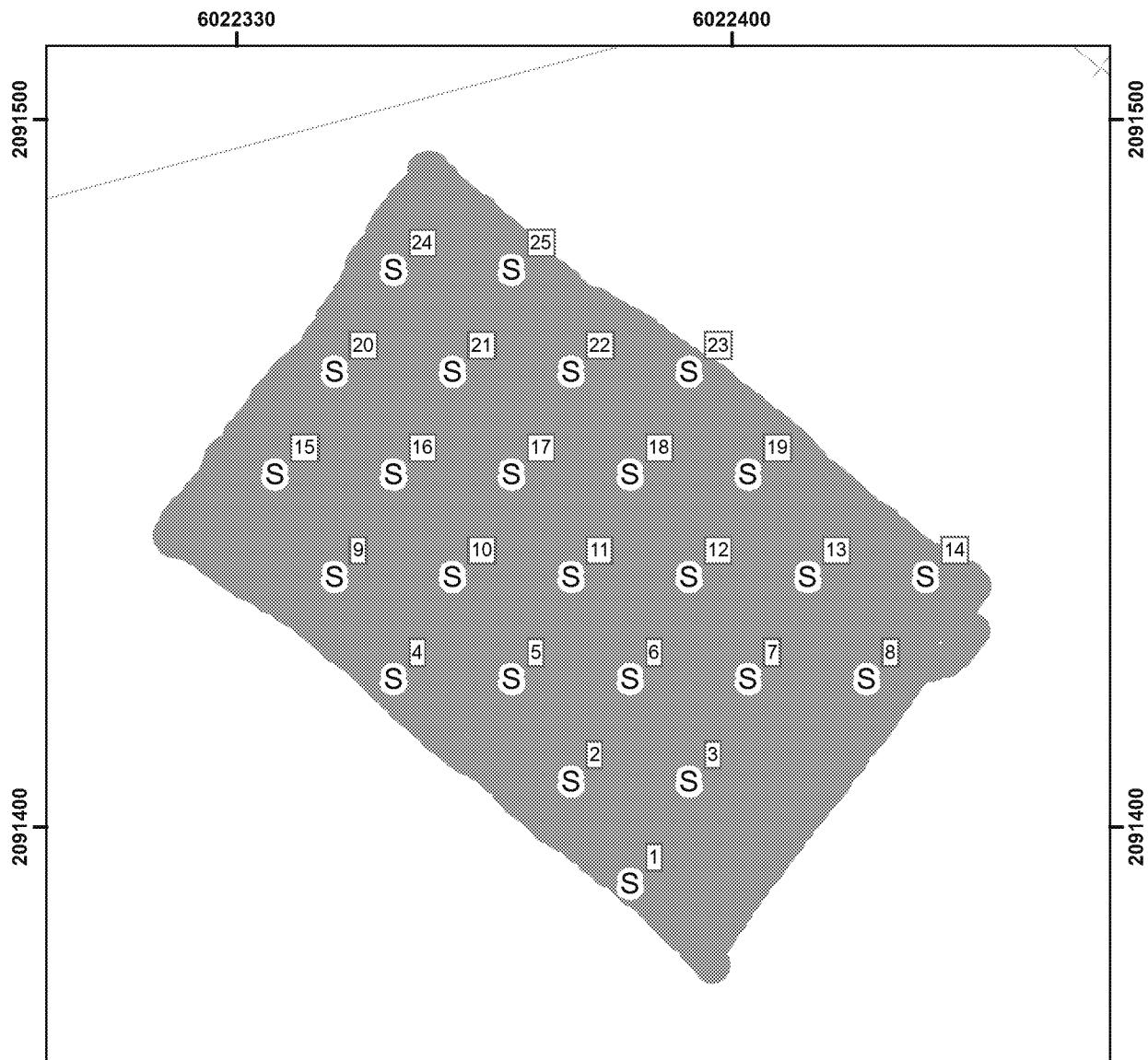
- ◆ Follow-Up Locations
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

25 12.5 0 25 Feet  
Coordinate system: CSP Zone III, NAD83, US Survey Foot



Systematic Sampling  
HPNS Parcel G  
RSY 39 Use 1

TU-108A SFU



**RSY 39 Use 1**

S Systematic Sample Locations

● RS-700 GWS Coverage

0 10 20 40 Feet

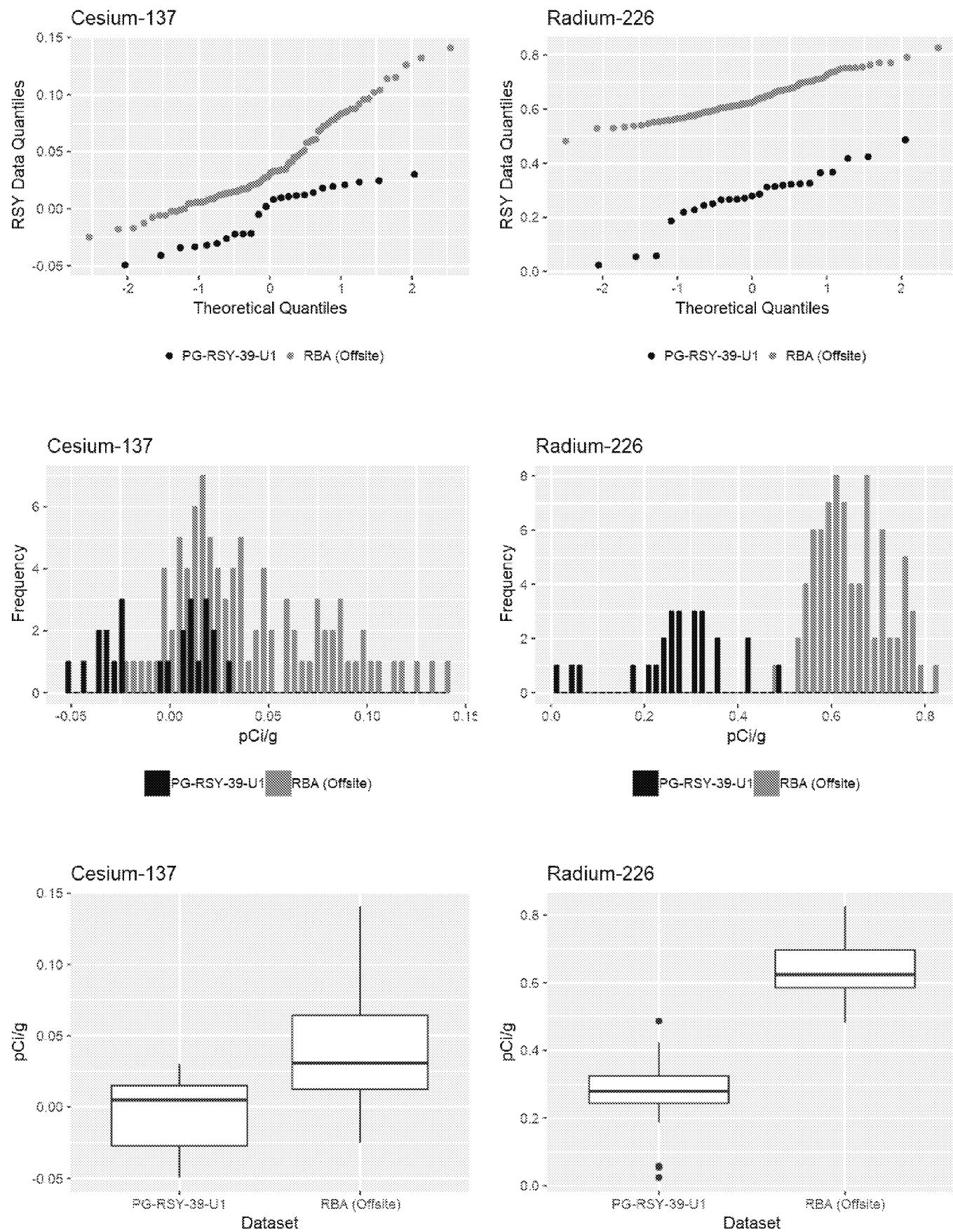
Coordinate system: CSP Zone III, NAD83, US Survey Foot



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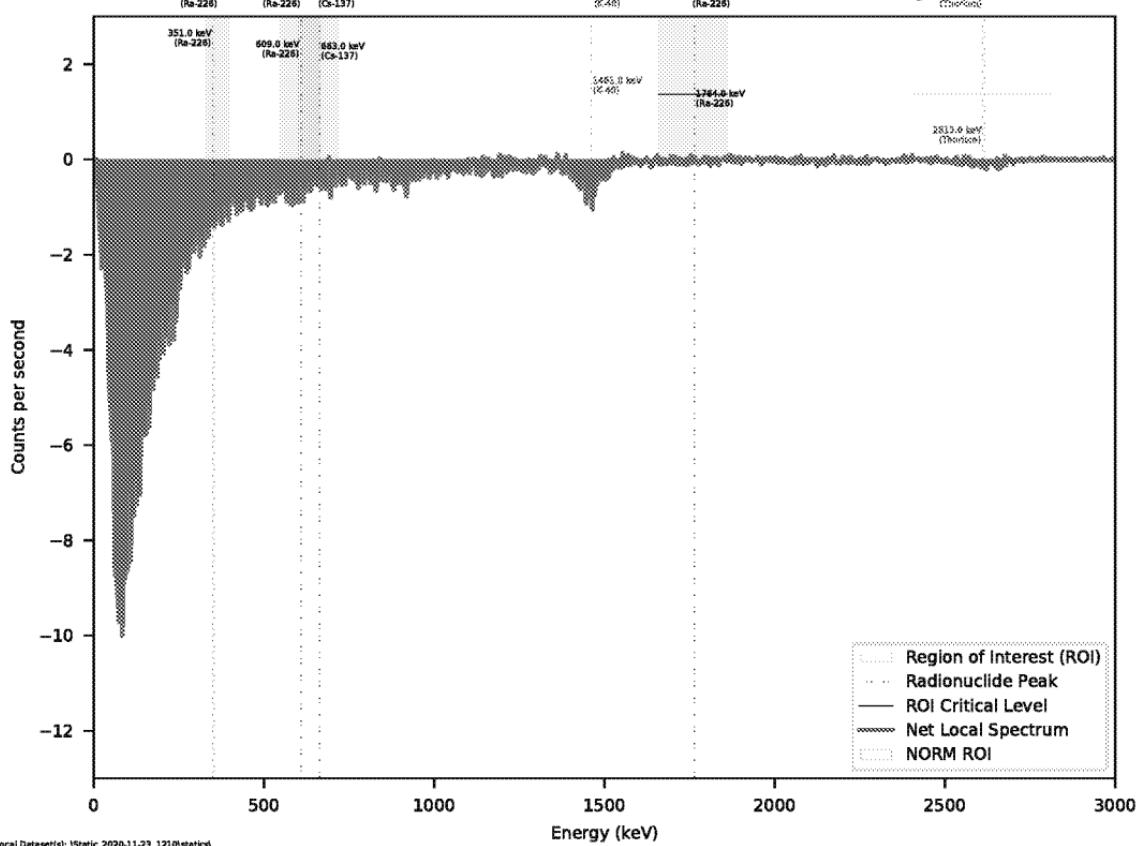
## Soil Sample Statistics





# Net Gamma Spectrum, Static Location: 1

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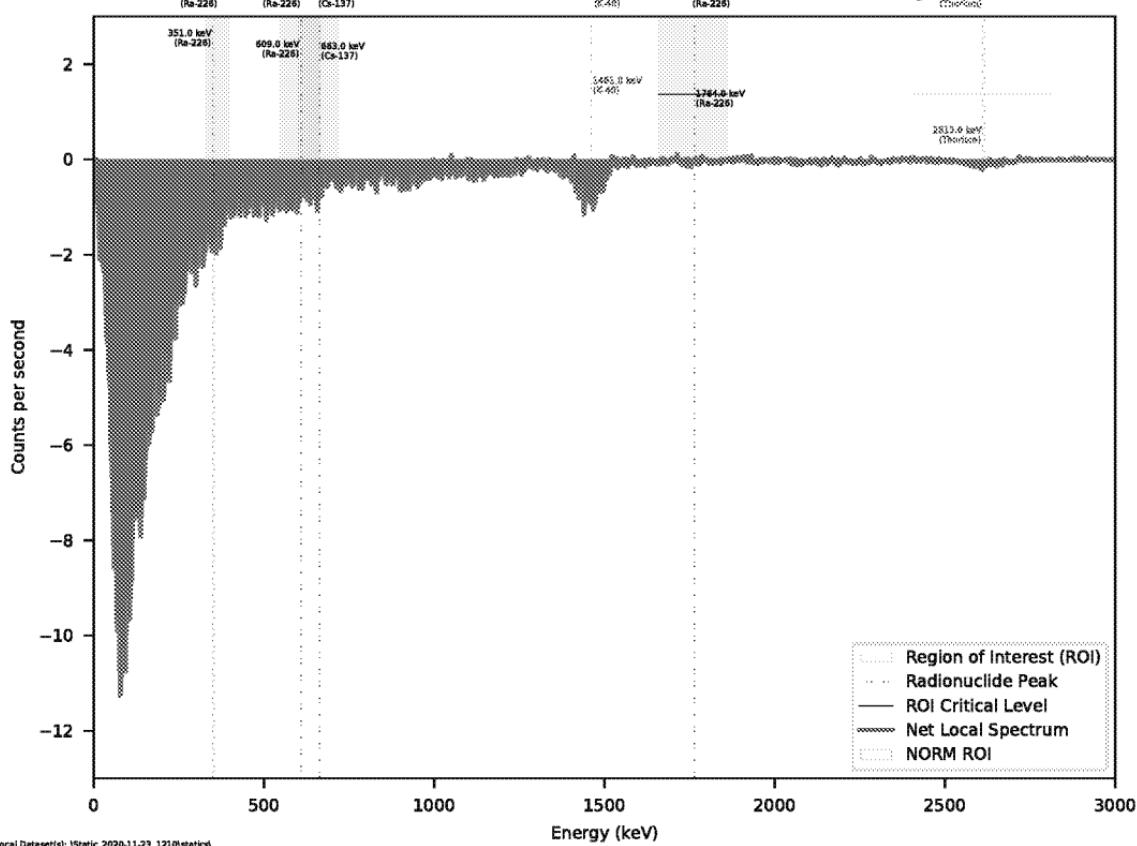
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Background Dataset(s): RSII\_SoilRBA\_Static.csv

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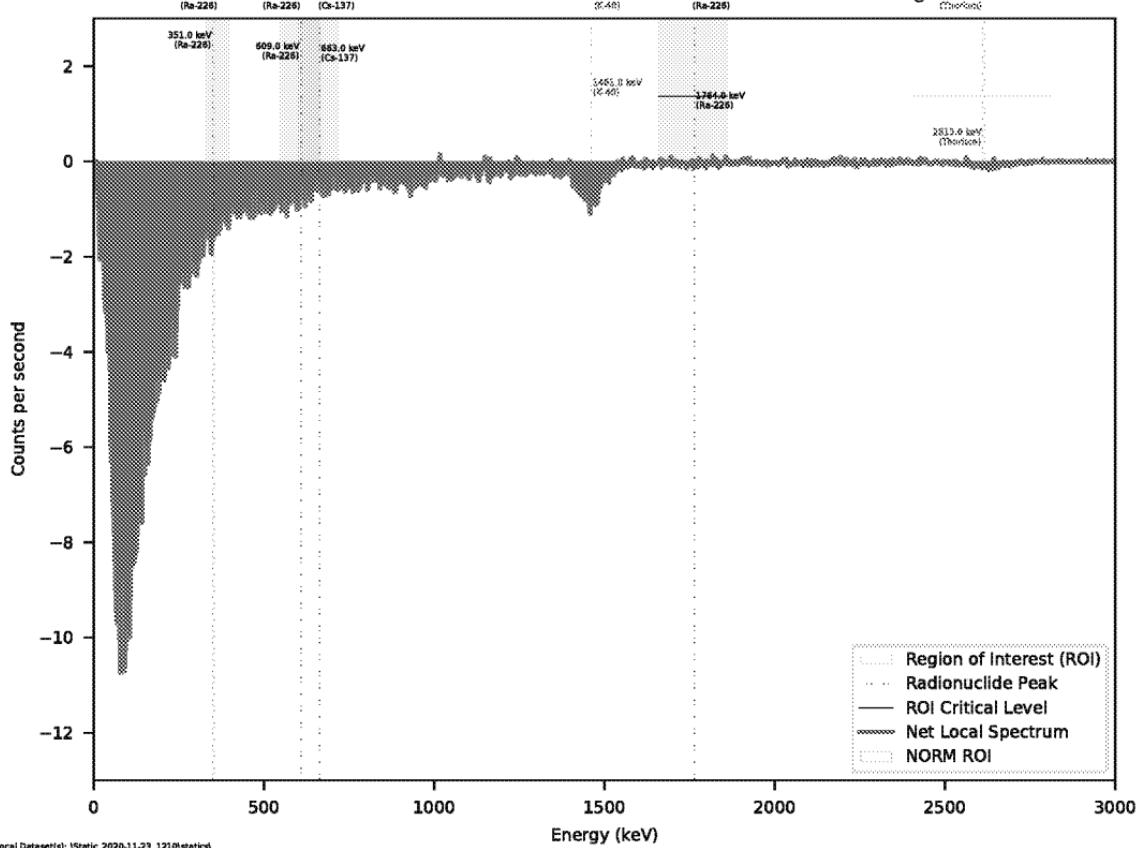
# Net Gamma Spectrum, Static Location: 2

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## Net Gamma Spectrum, Static Location: 3

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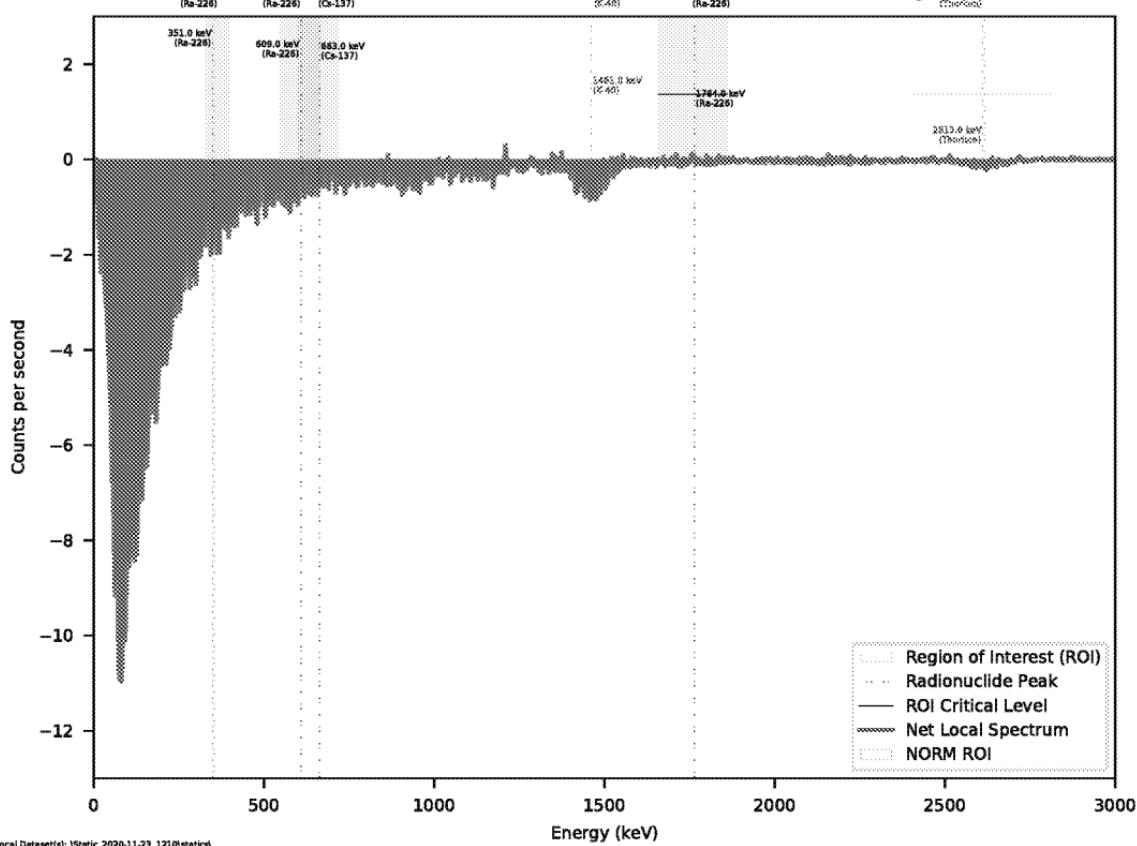
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## Net Gamma Spectrum, Static Location: 4

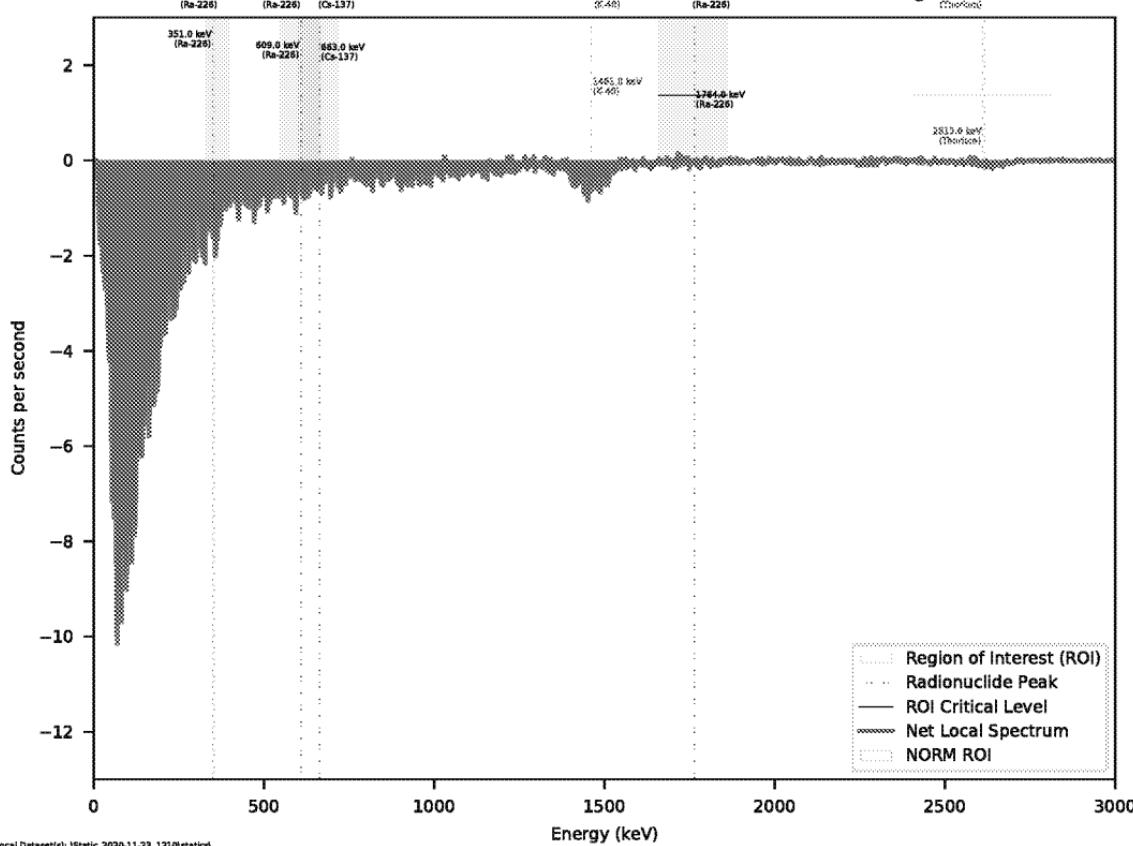
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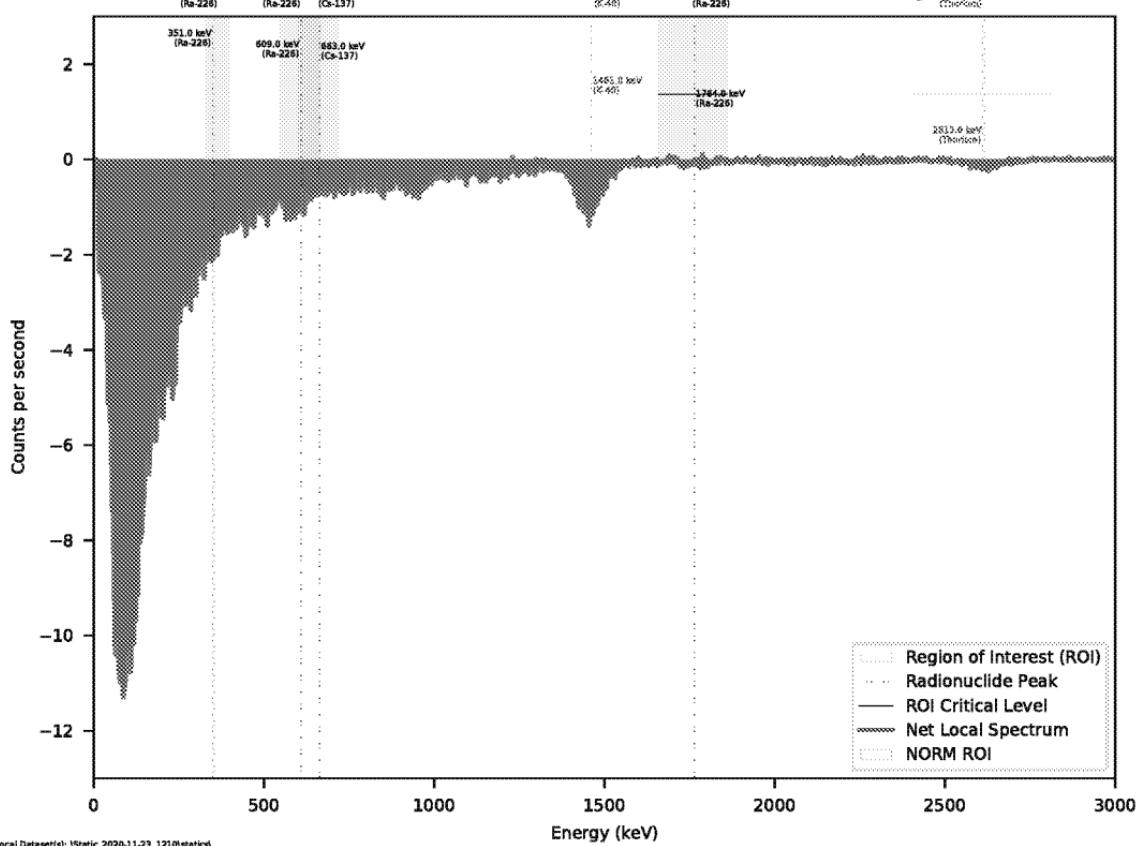
## Net Gamma Spectrum, Static Location: 5

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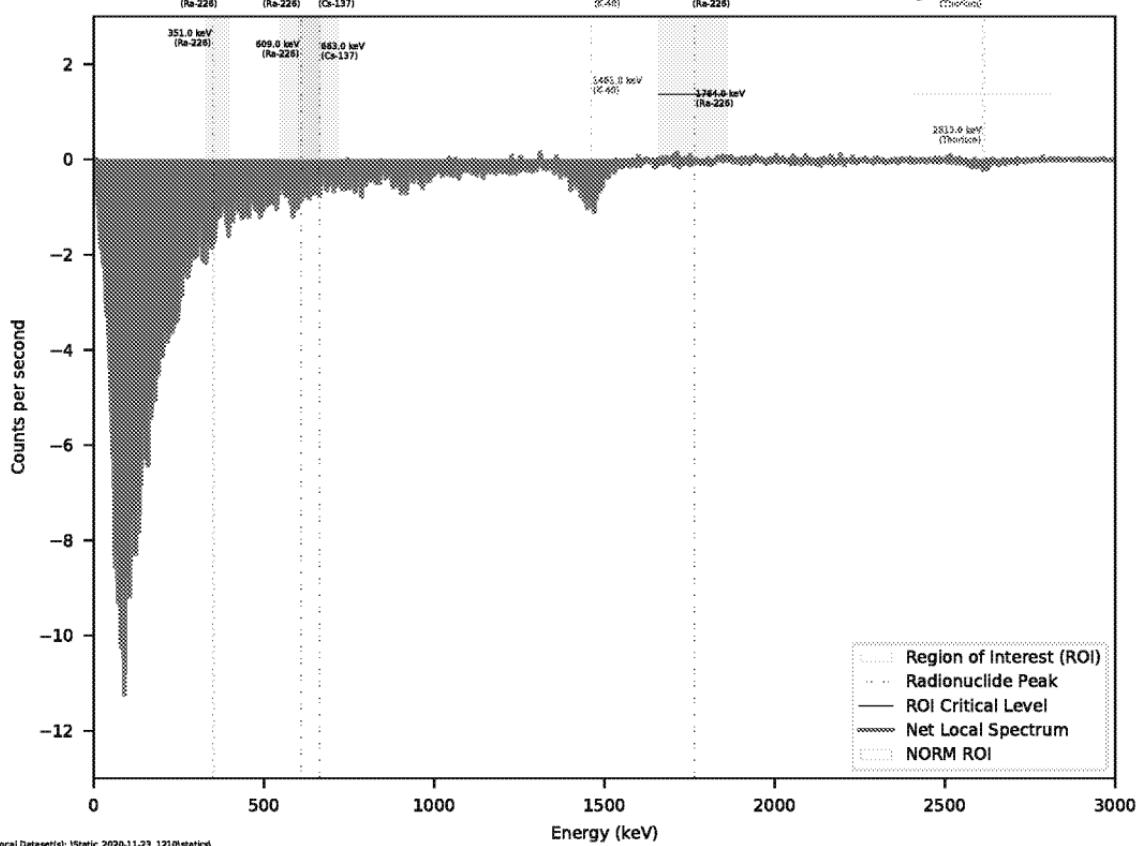
# Net Gamma Spectrum, Static Location: 6

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## Net Gamma Spectrum, Static Location: 7

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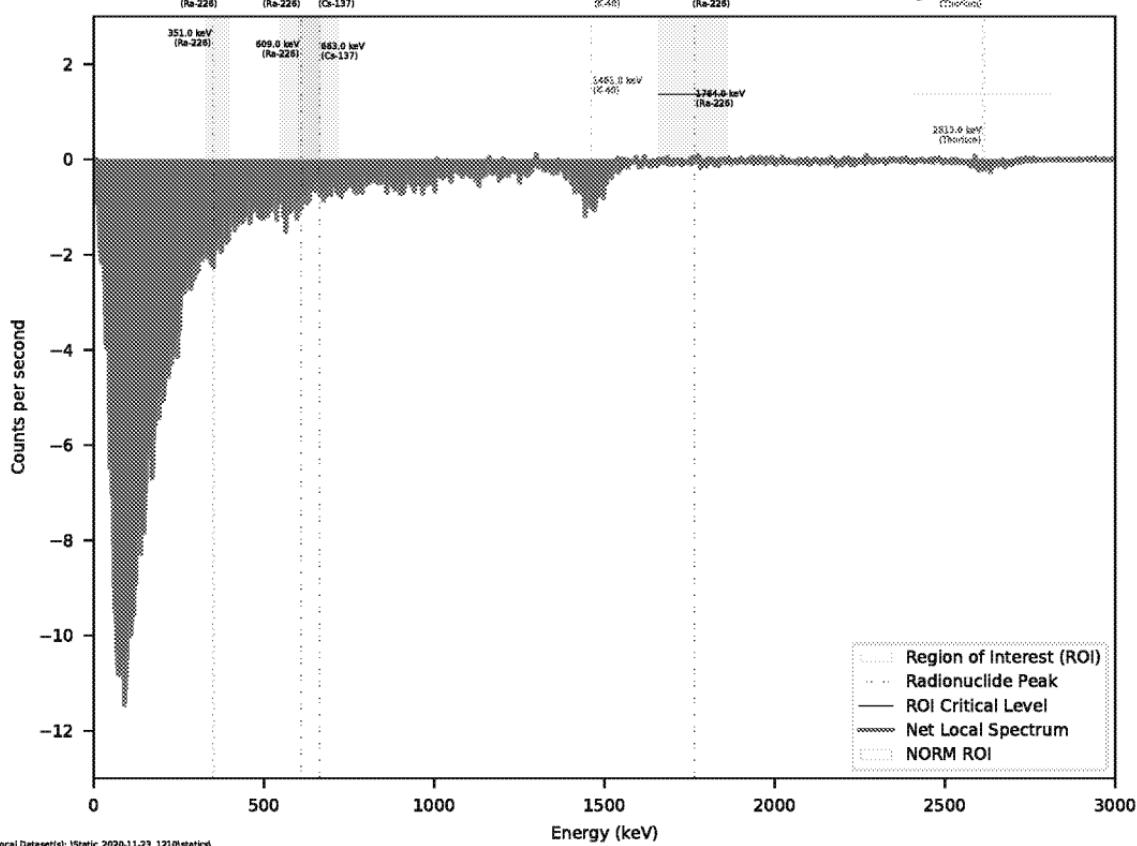
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# Net Gamma Spectrum, Static Location: 8

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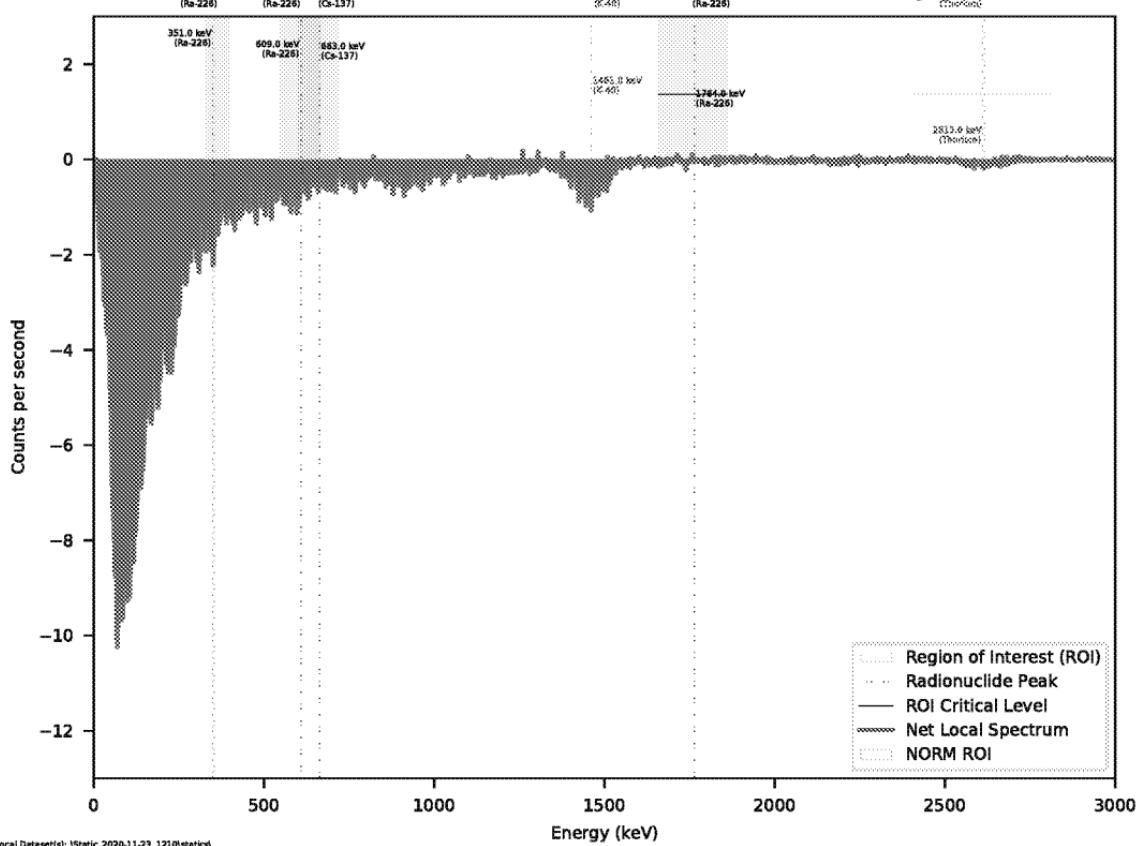
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## Net Gamma Spectrum, Static Location: 9

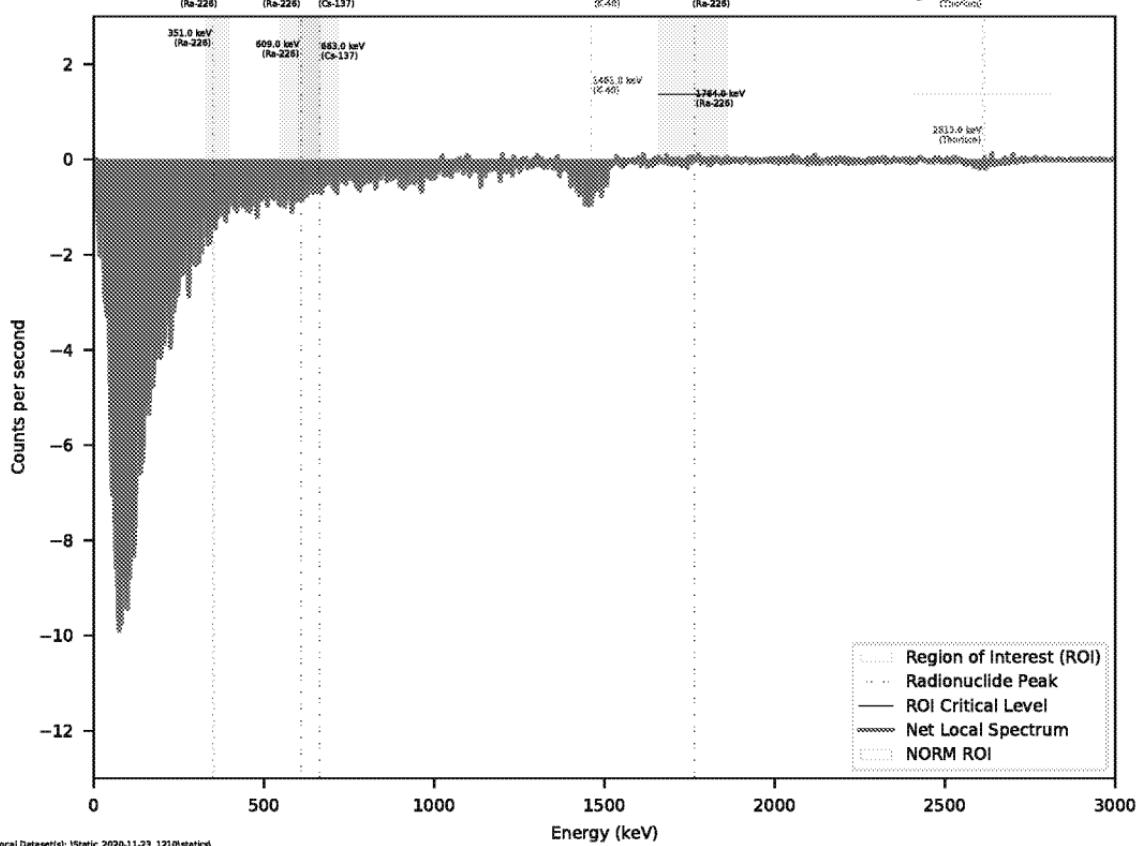
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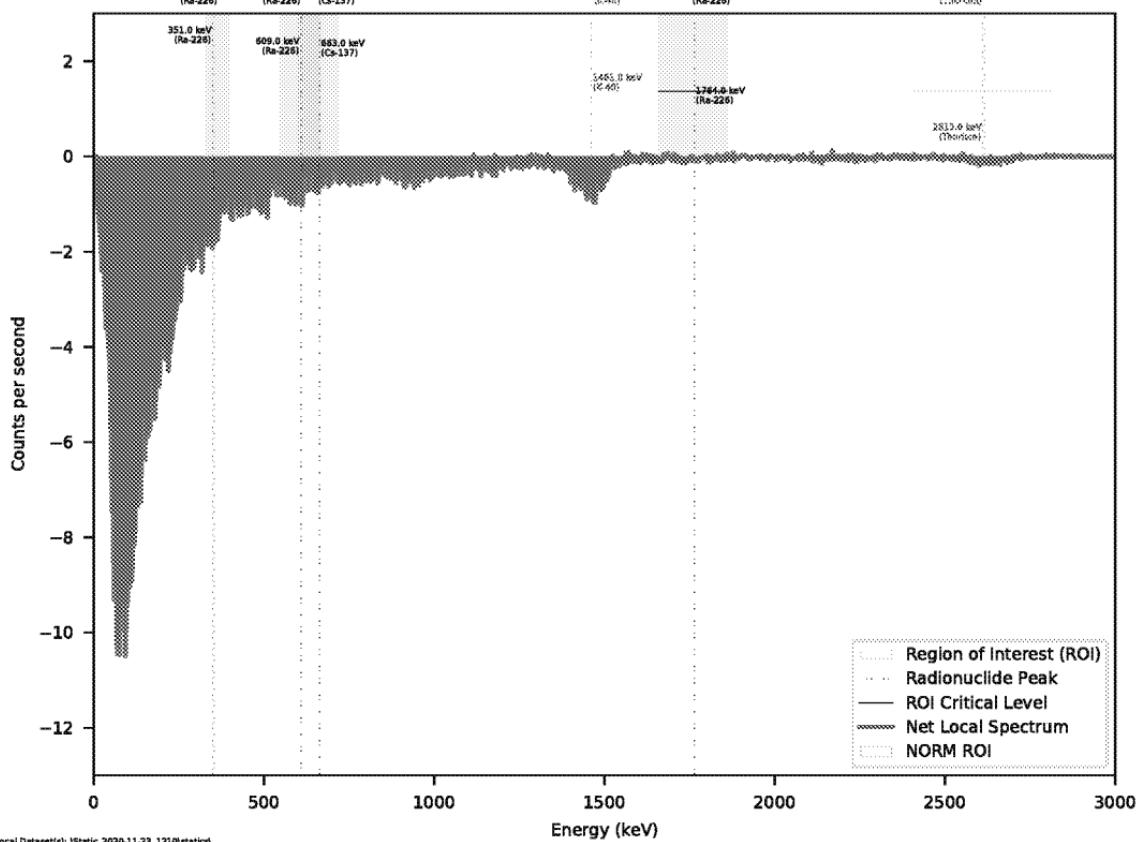
## Net Gamma Spectrum, Static Location: 10

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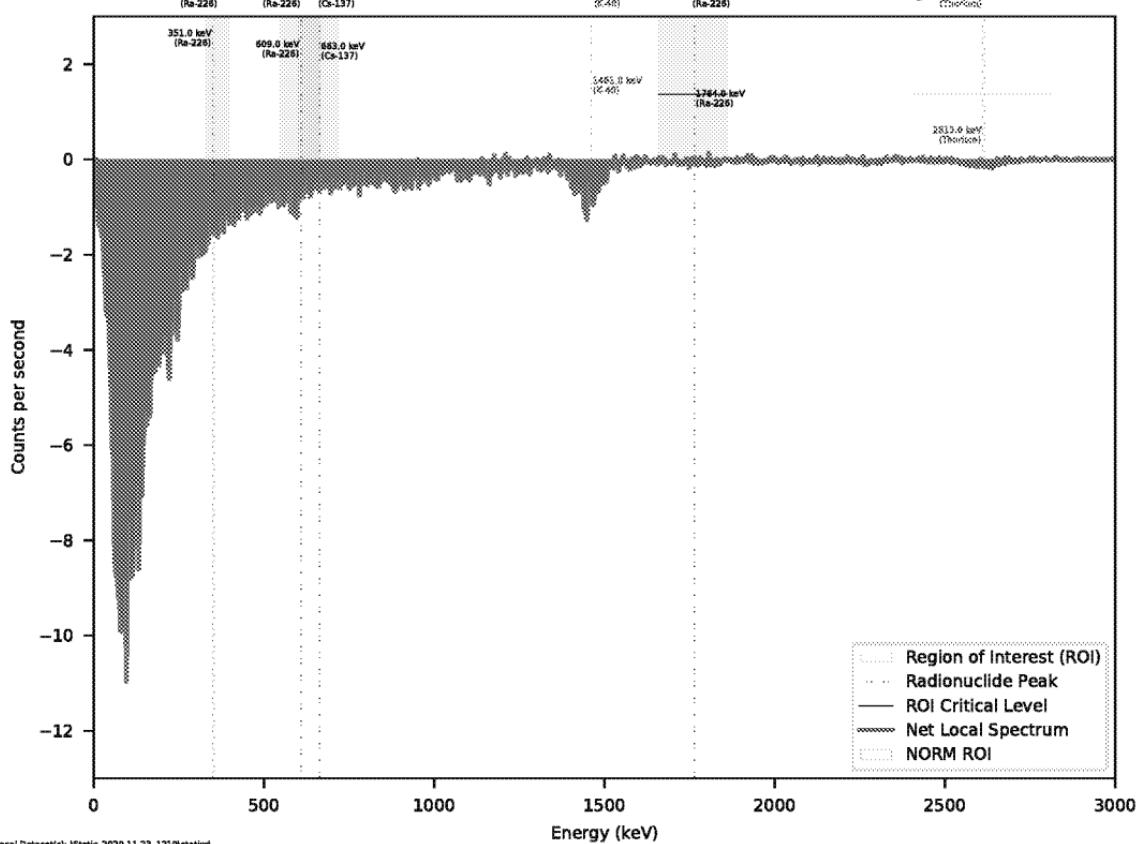
# Net Gamma Spectrum, Static Location: 11

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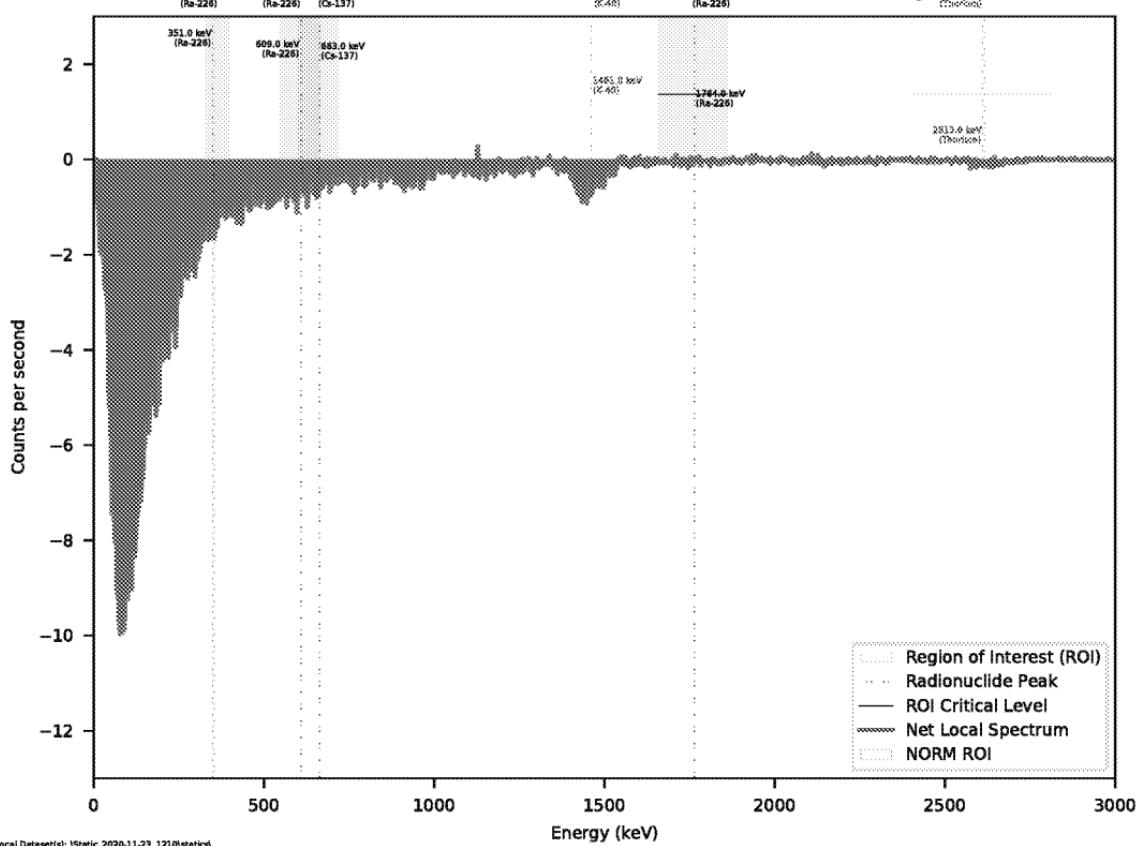
# Net Gamma Spectrum, Static Location: 12

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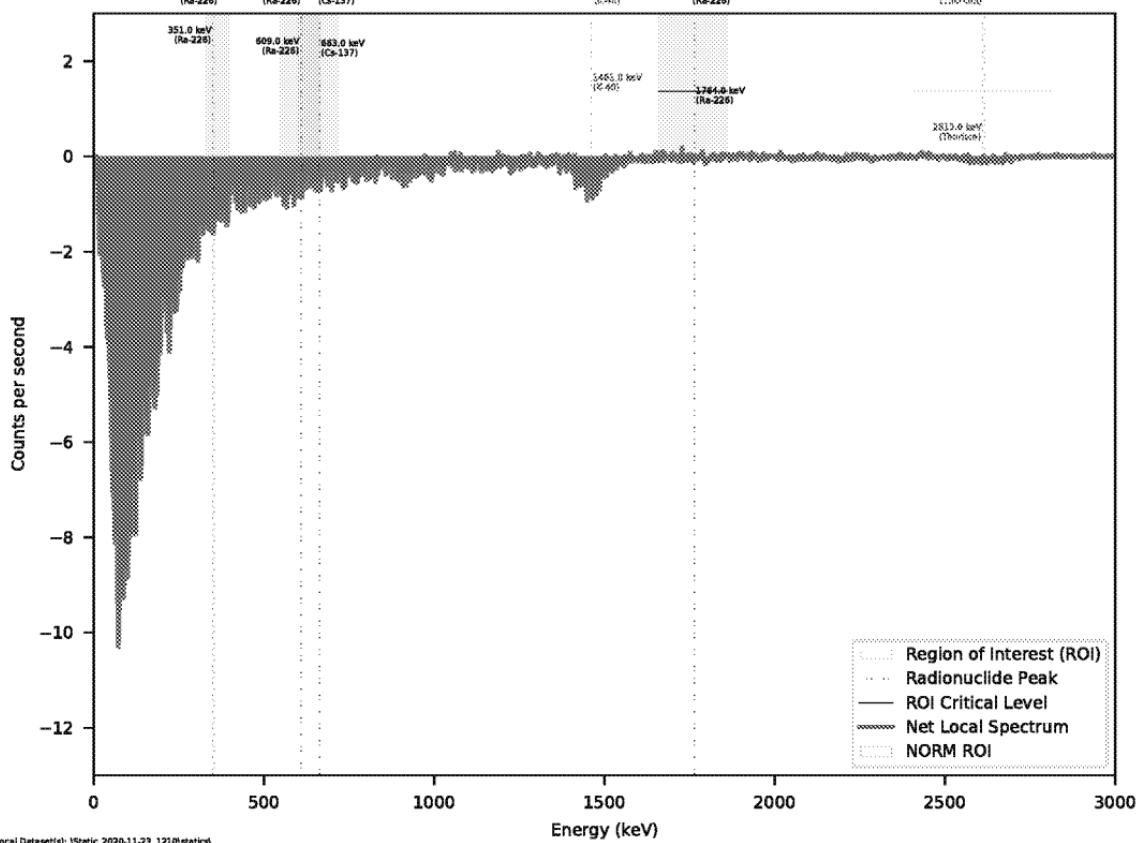
## Net Gamma Spectrum, Static Location: 13

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# Net Gamma Spectrum, Static Location: 14

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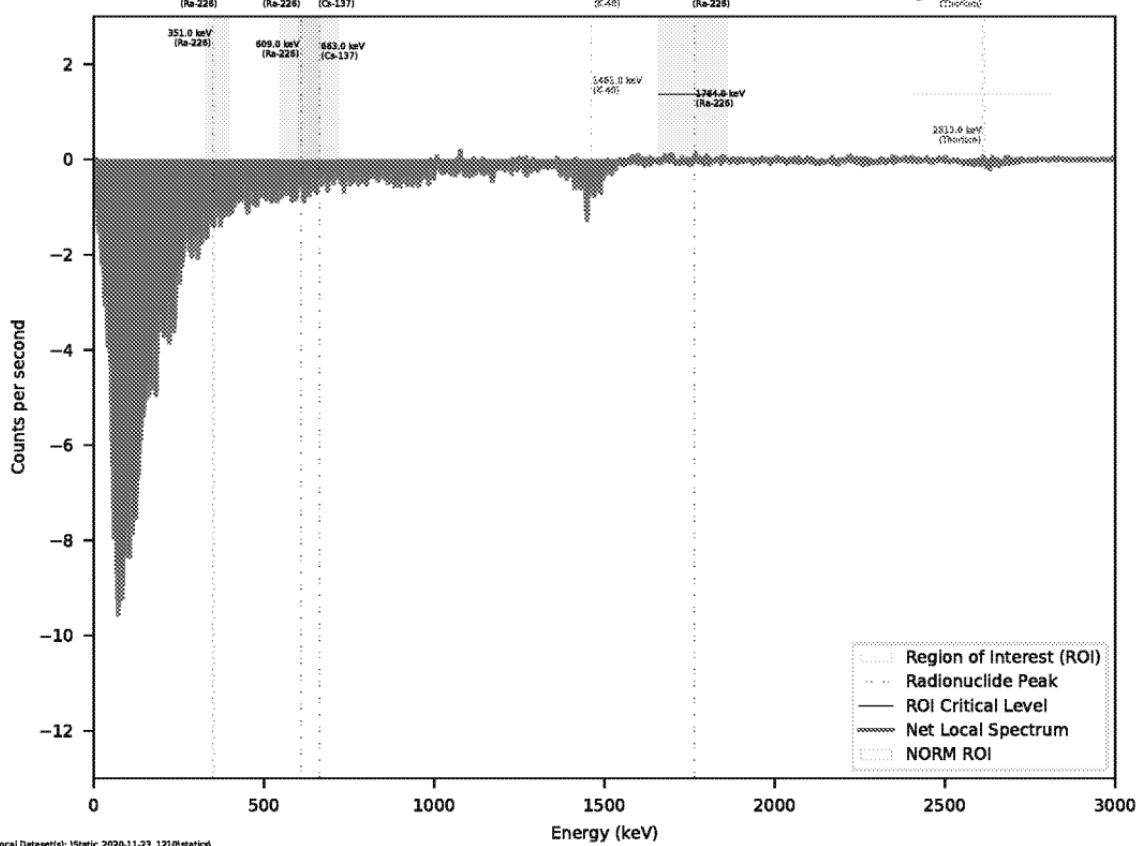
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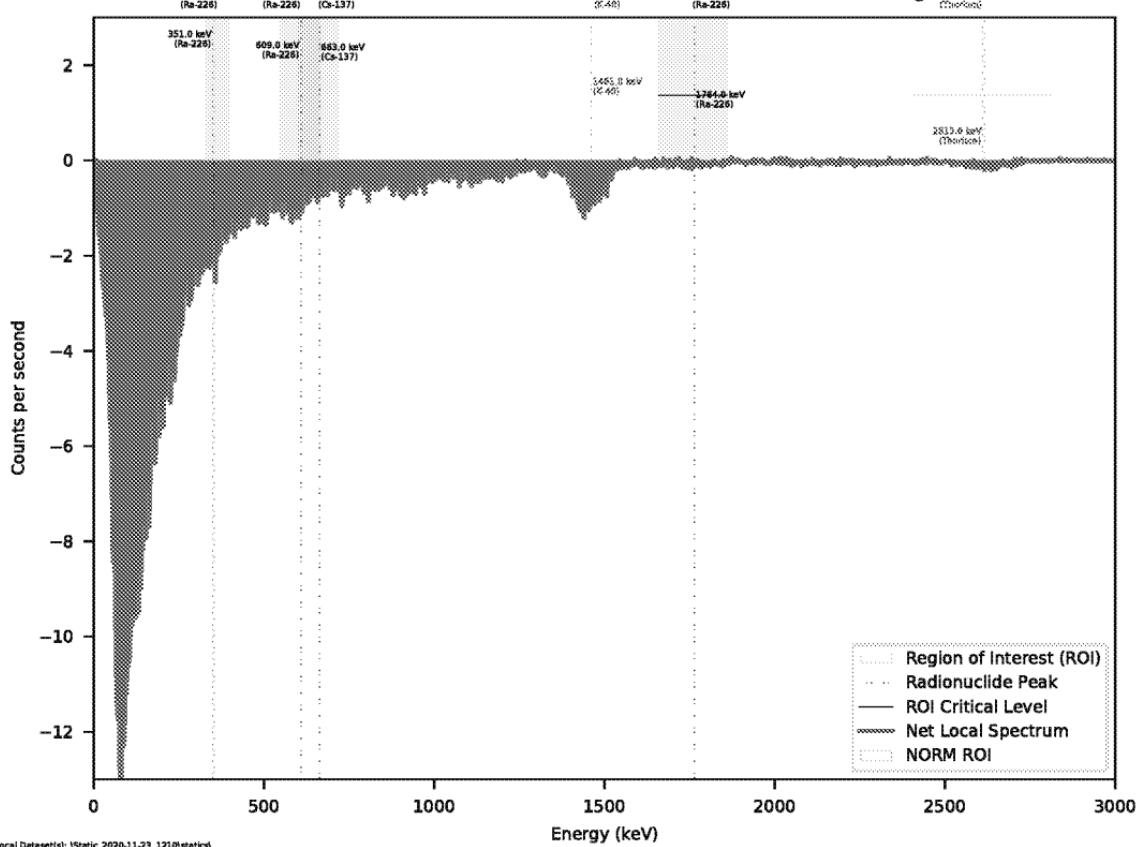
## Net Gamma Spectrum, Static Location: 15

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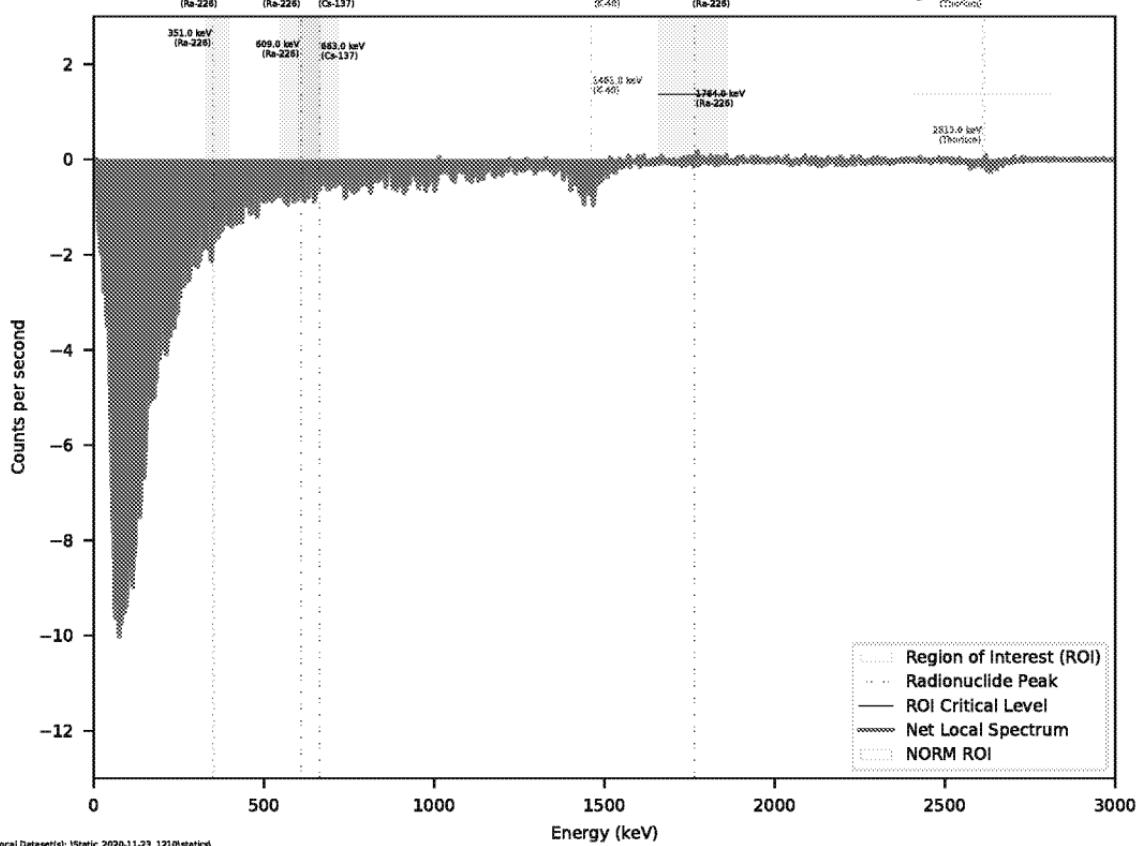
## Net Gamma Spectrum, Static Location: 16

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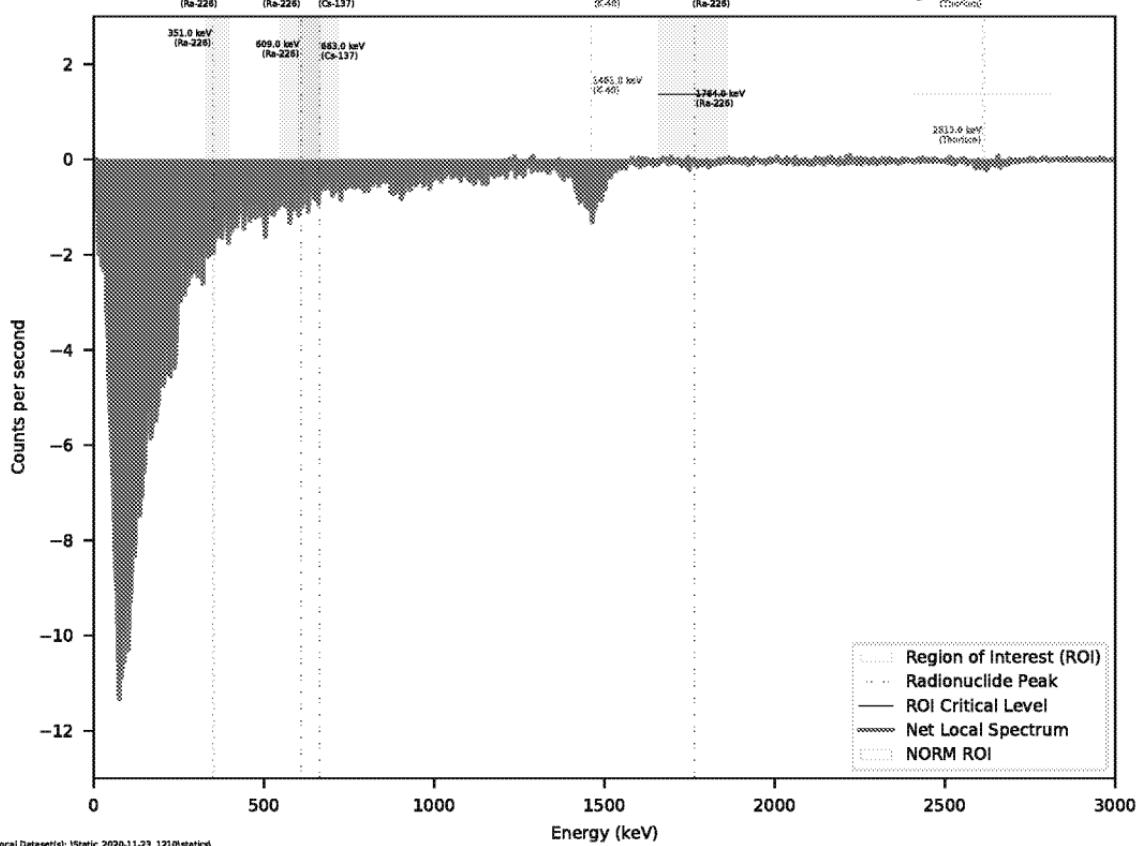
## Net Gamma Spectrum, Static Location: 17

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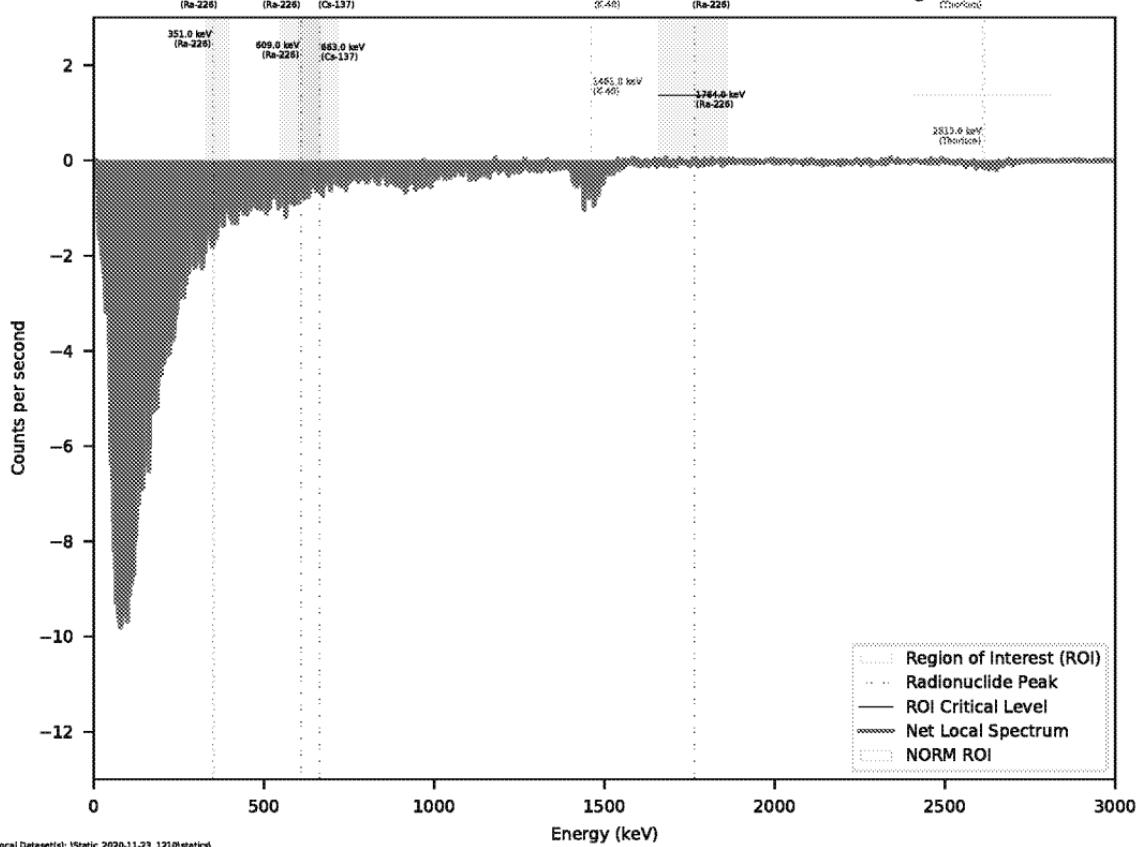
## Net Gamma Spectrum, Static Location: 18

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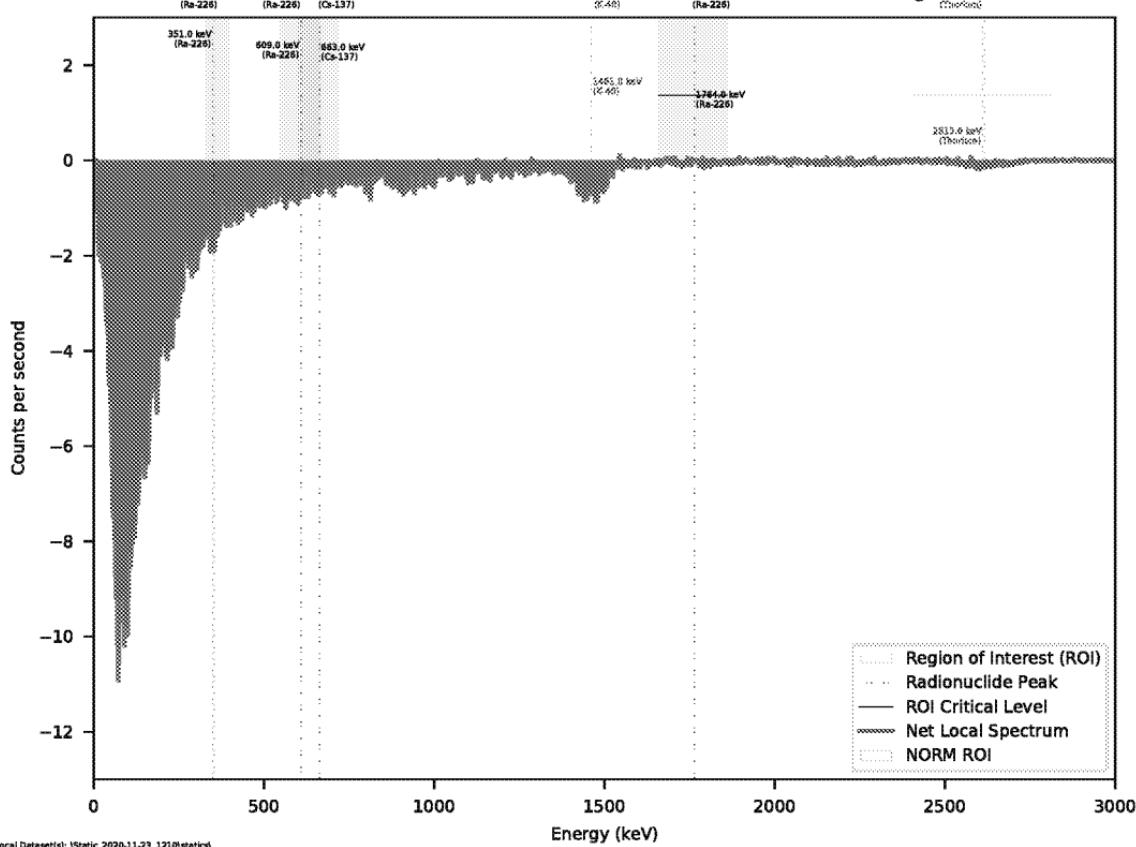
## Net Gamma Spectrum, Static Location: 19

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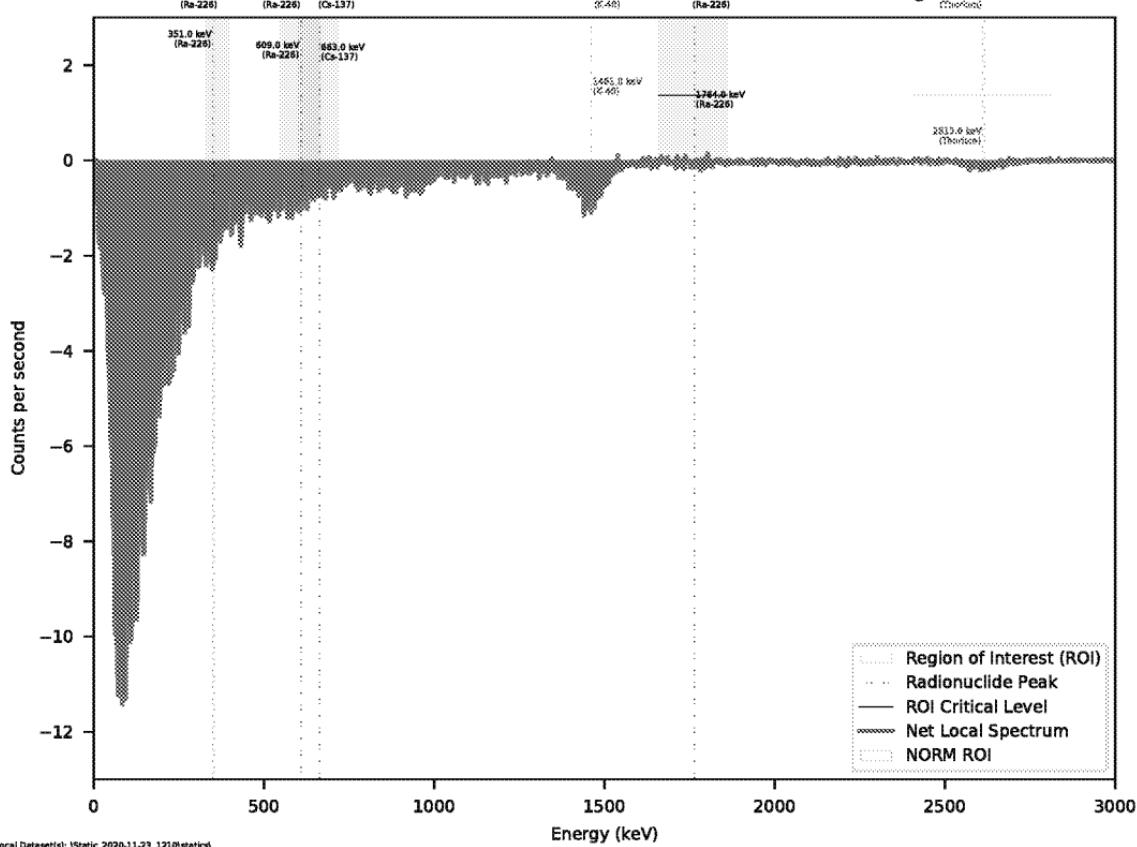
## Net Gamma Spectrum, Static Location: 20

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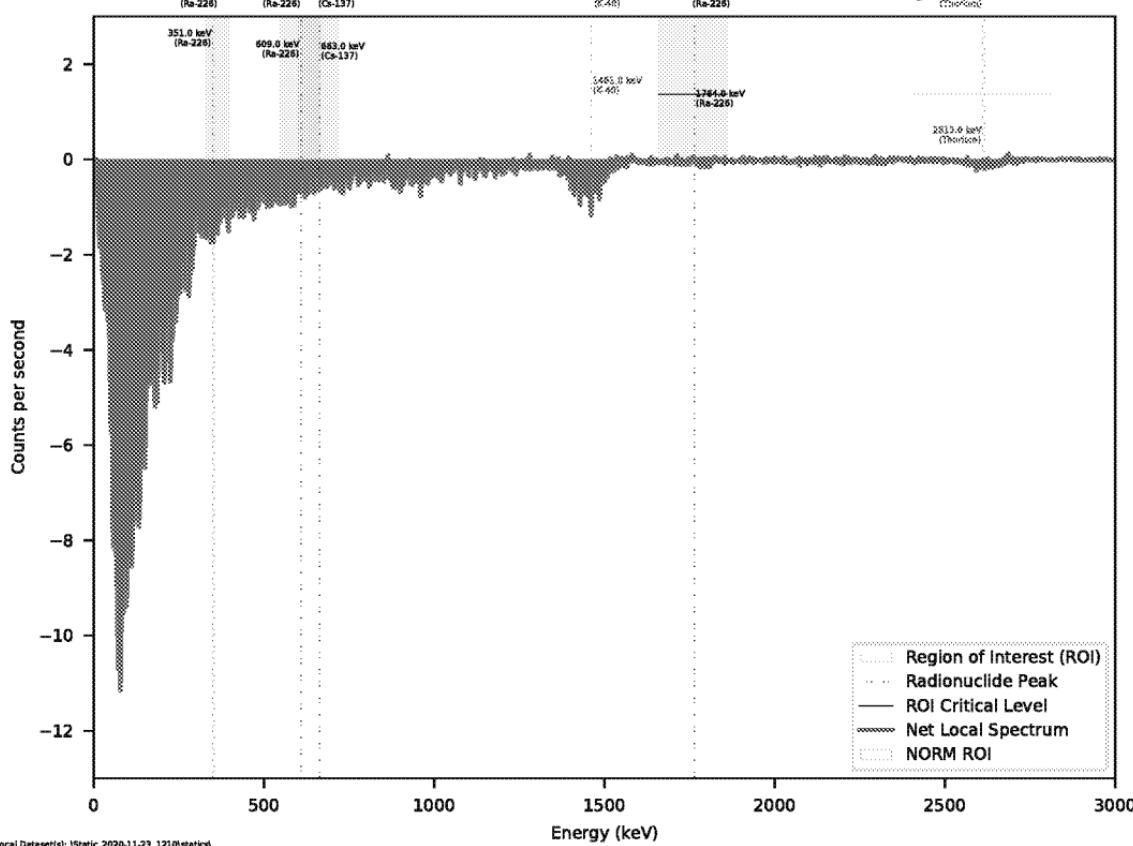
## Net Gamma Spectrum, Static Location: 21

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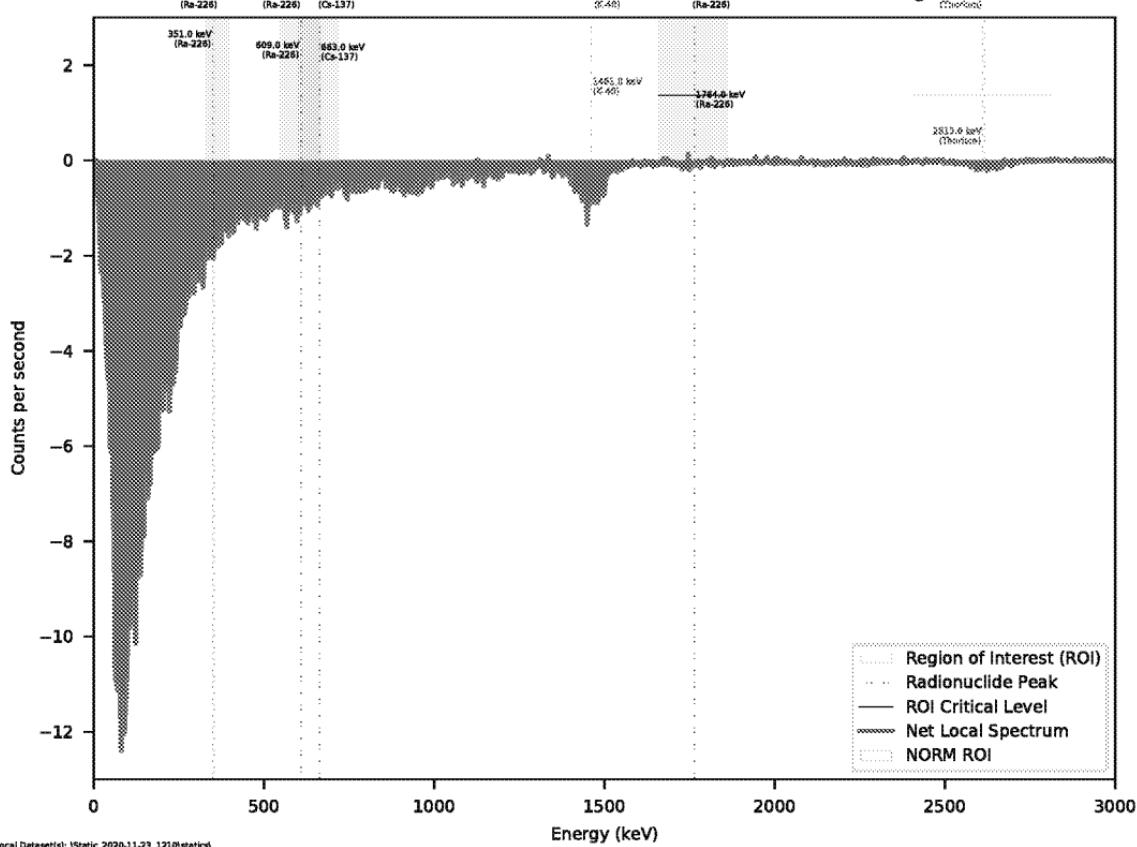
## Net Gamma Spectrum, Static Location: 22

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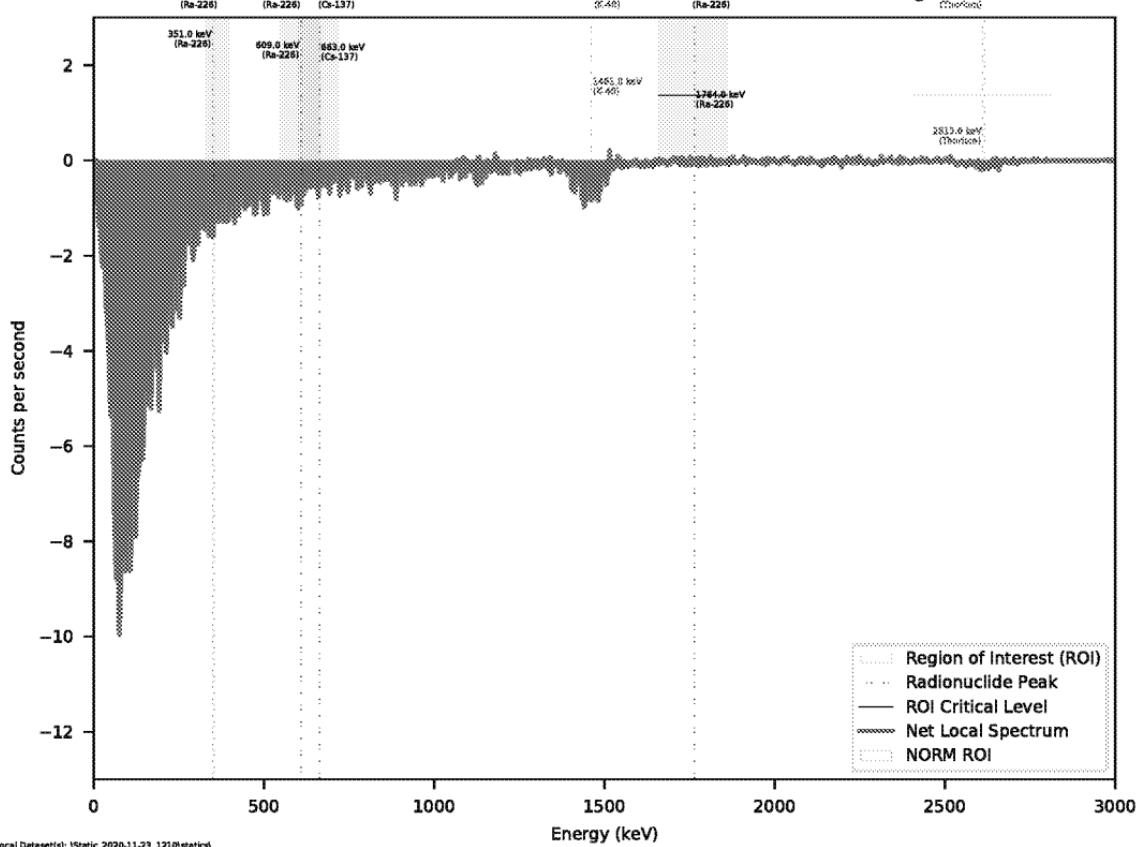
## Net Gamma Spectrum, Static Location: 23

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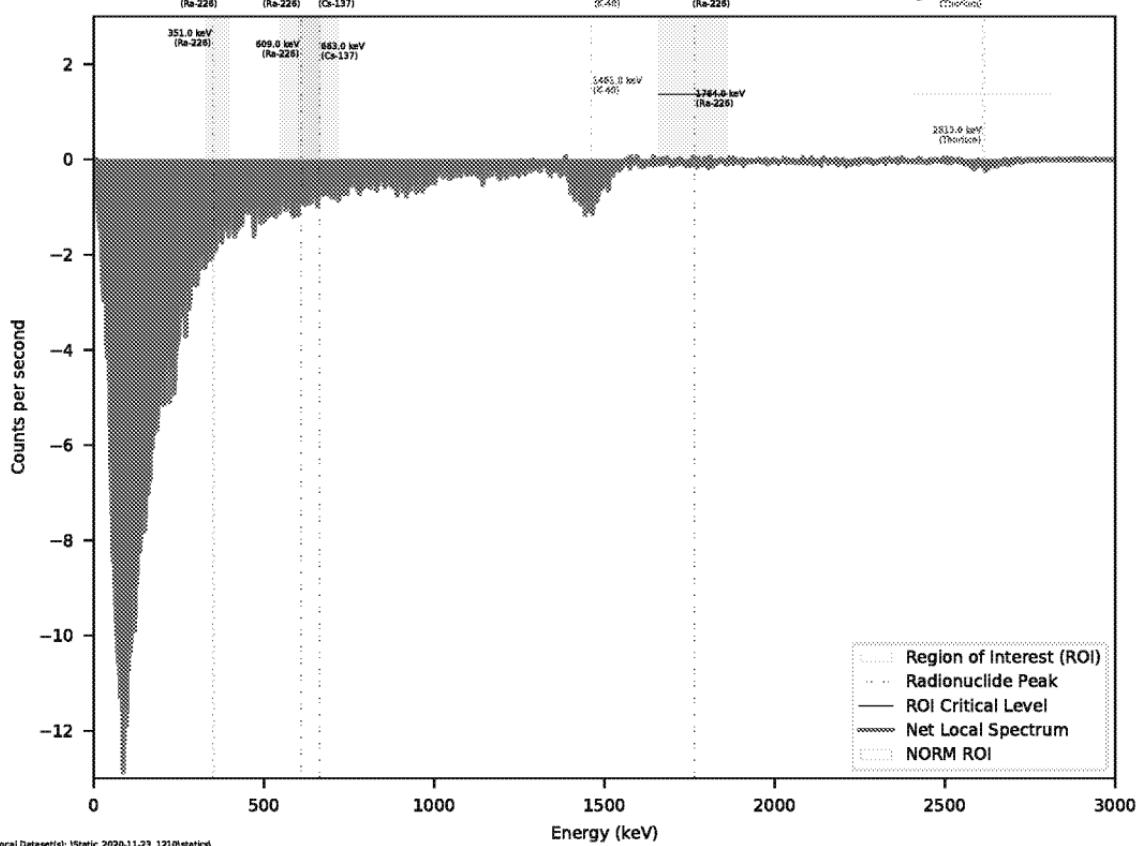
## Net Gamma Spectrum, Static Location: 24

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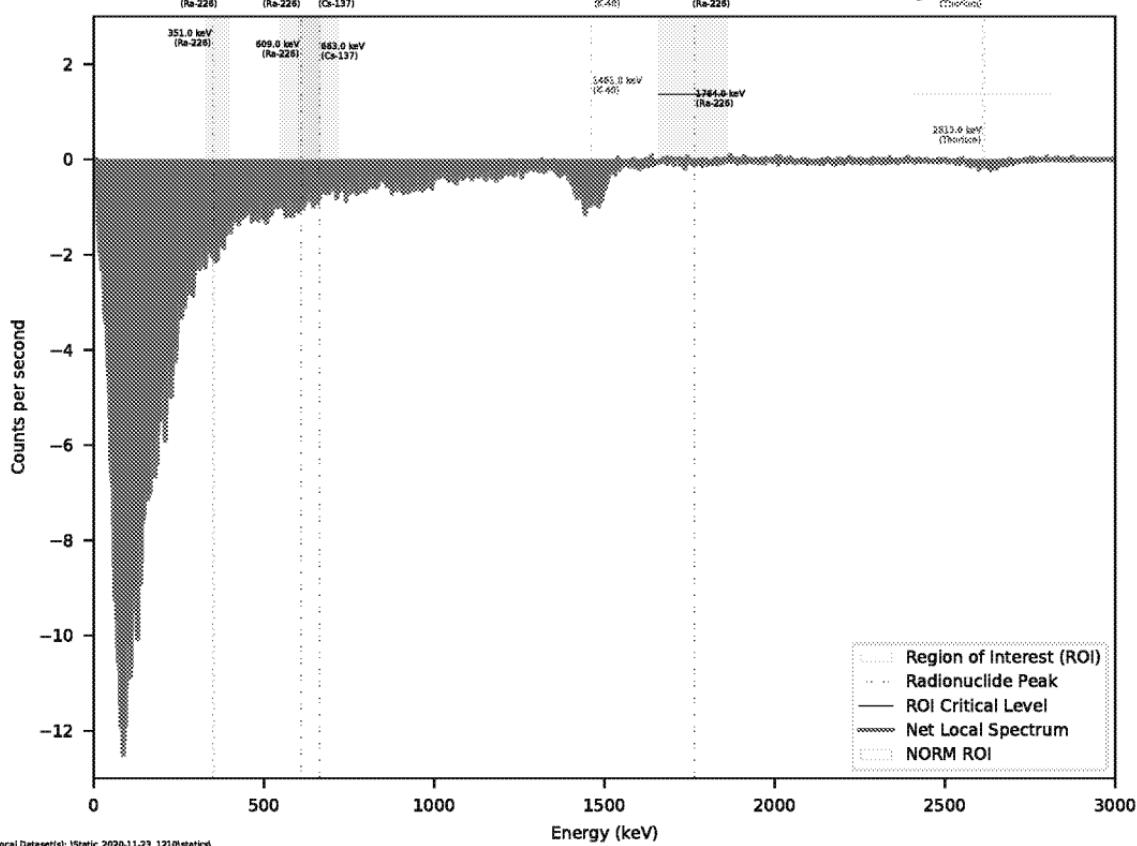
## Net Gamma Spectrum, Static Location: 25

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## Net Gamma Spectrum, Static Location: 26

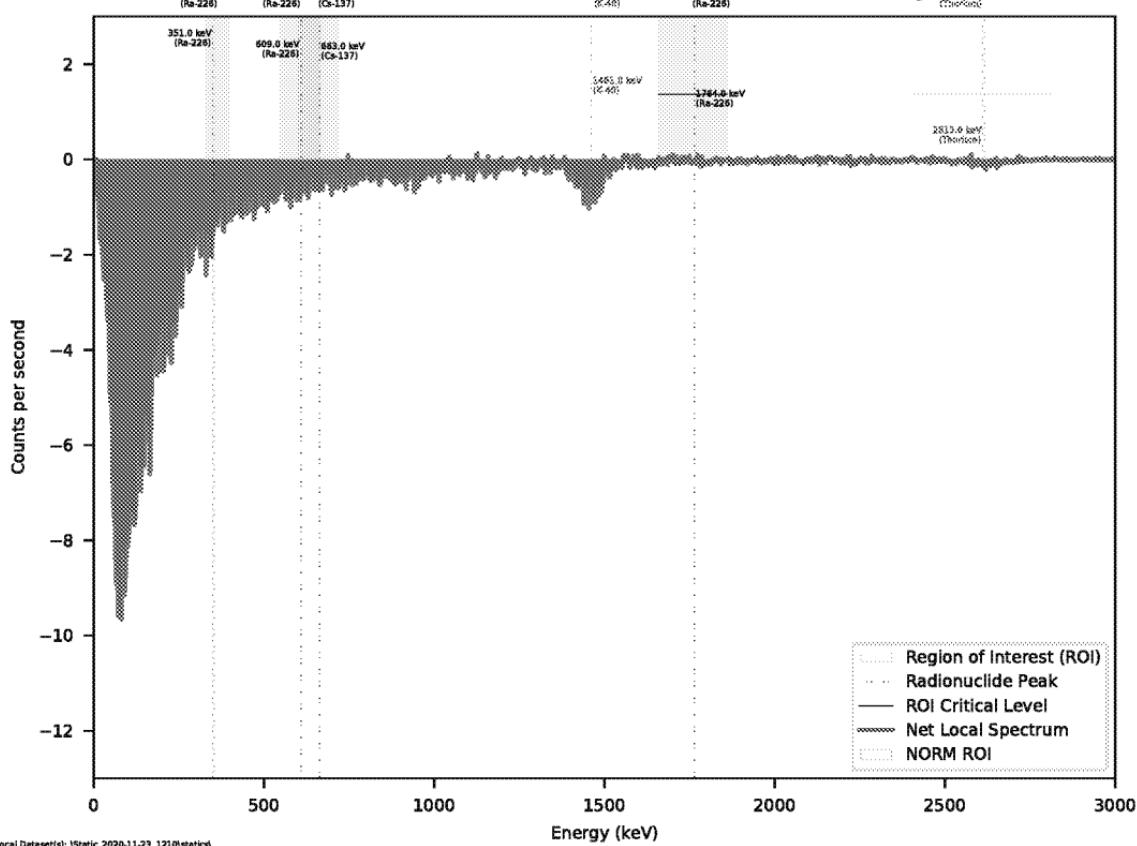
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## Net Gamma Spectrum, Static Location: 27

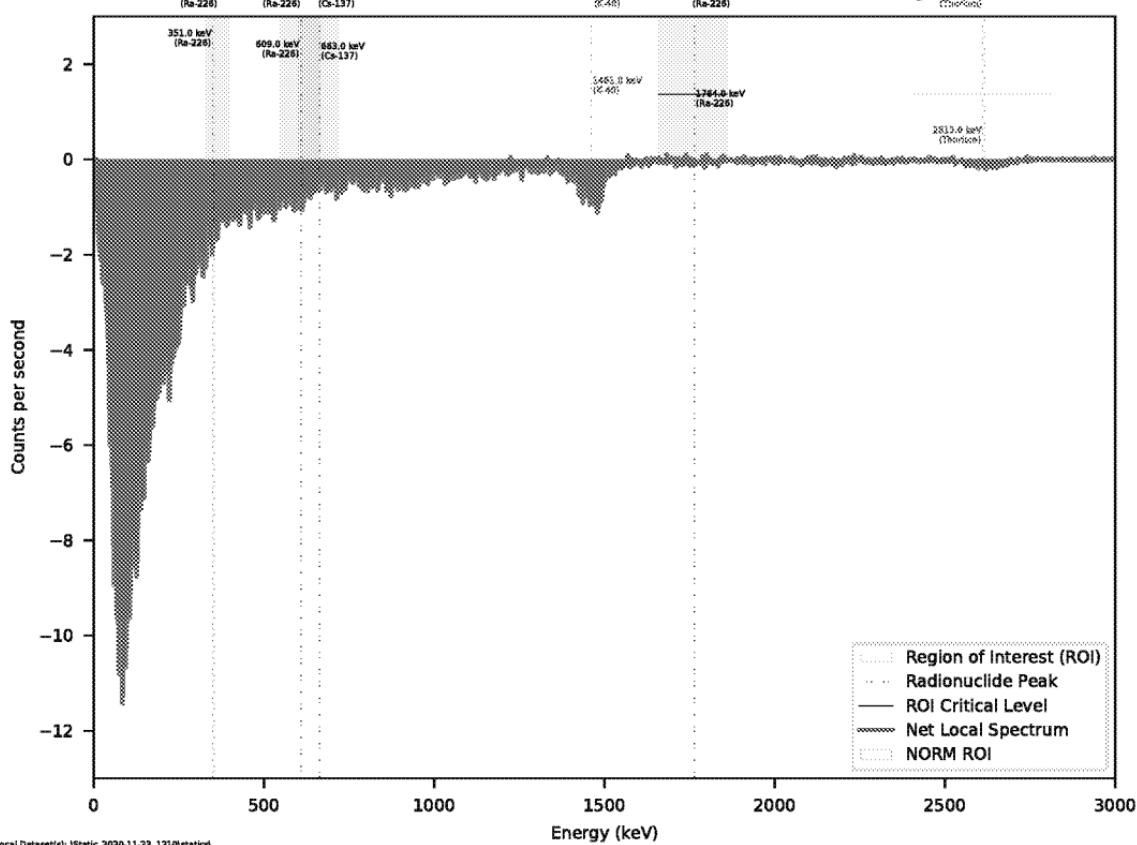
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ED\_006360A\_00000377-00040

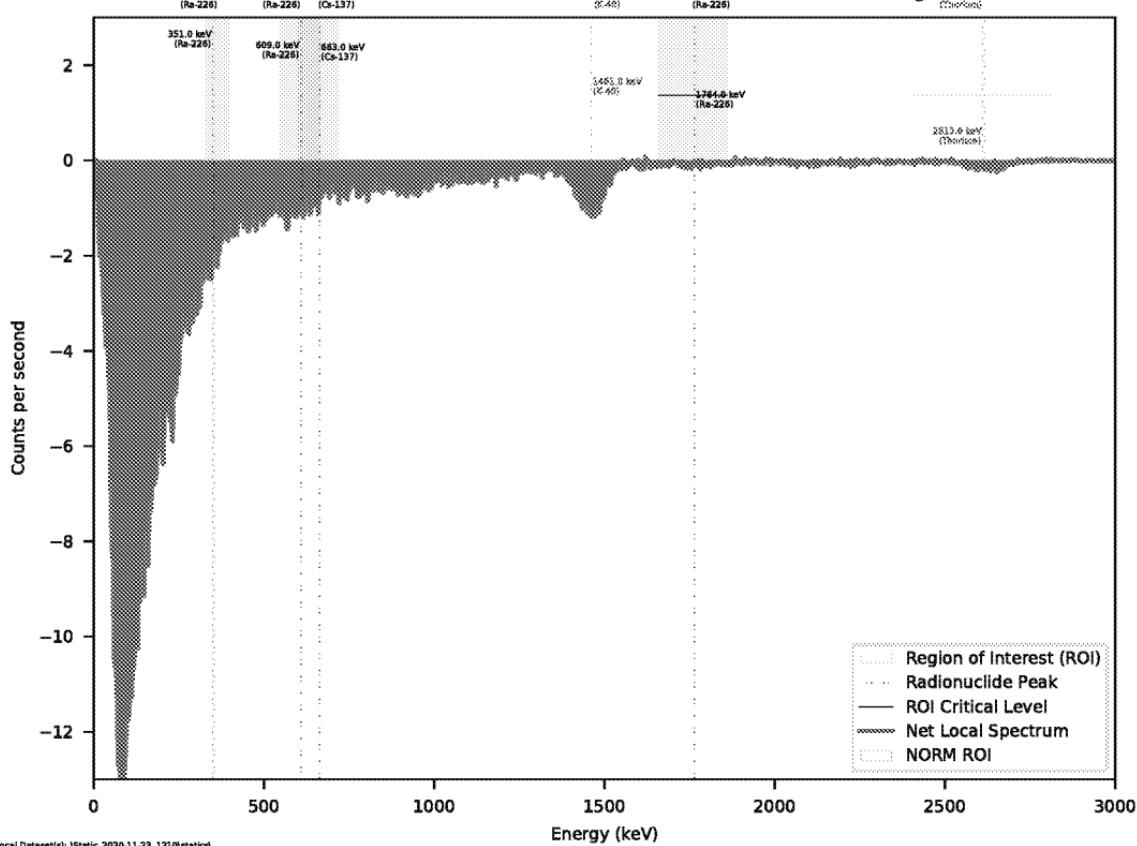
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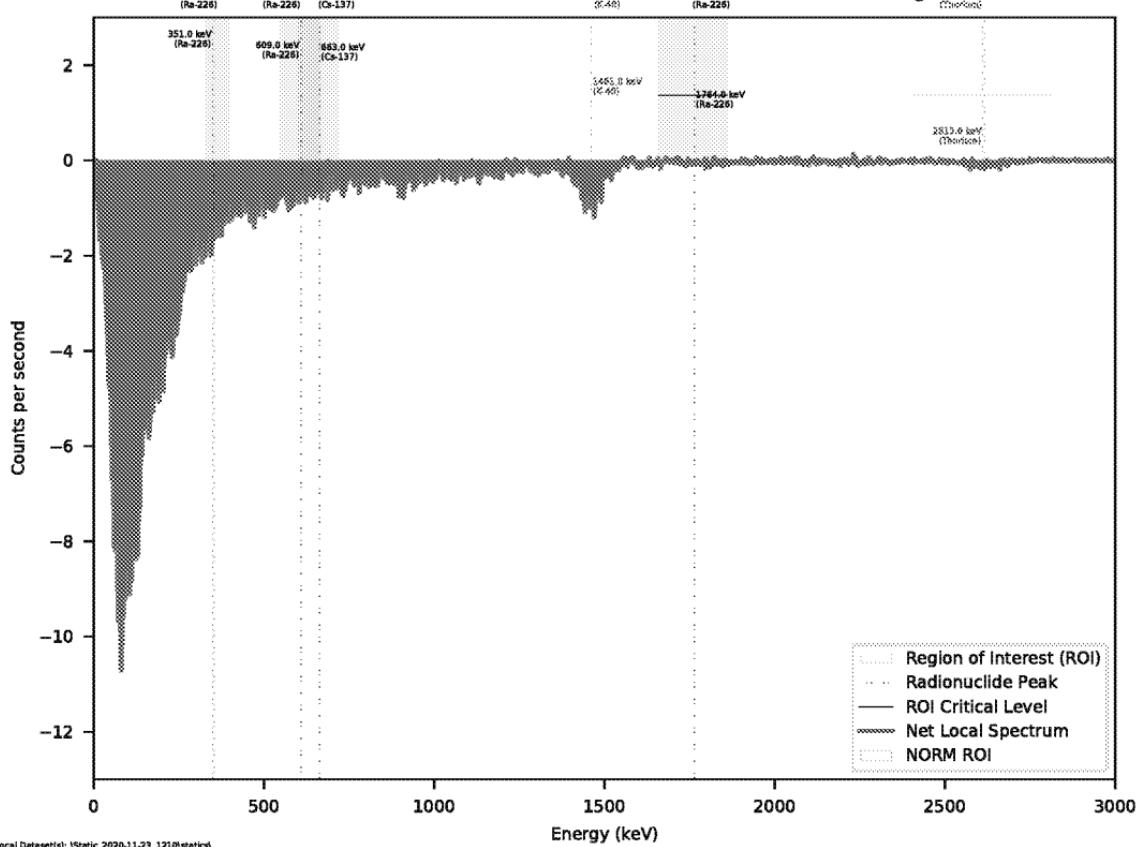
## Net Gamma Spectrum, Static Location: 29

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## Net Gamma Spectrum, Static Location: 30

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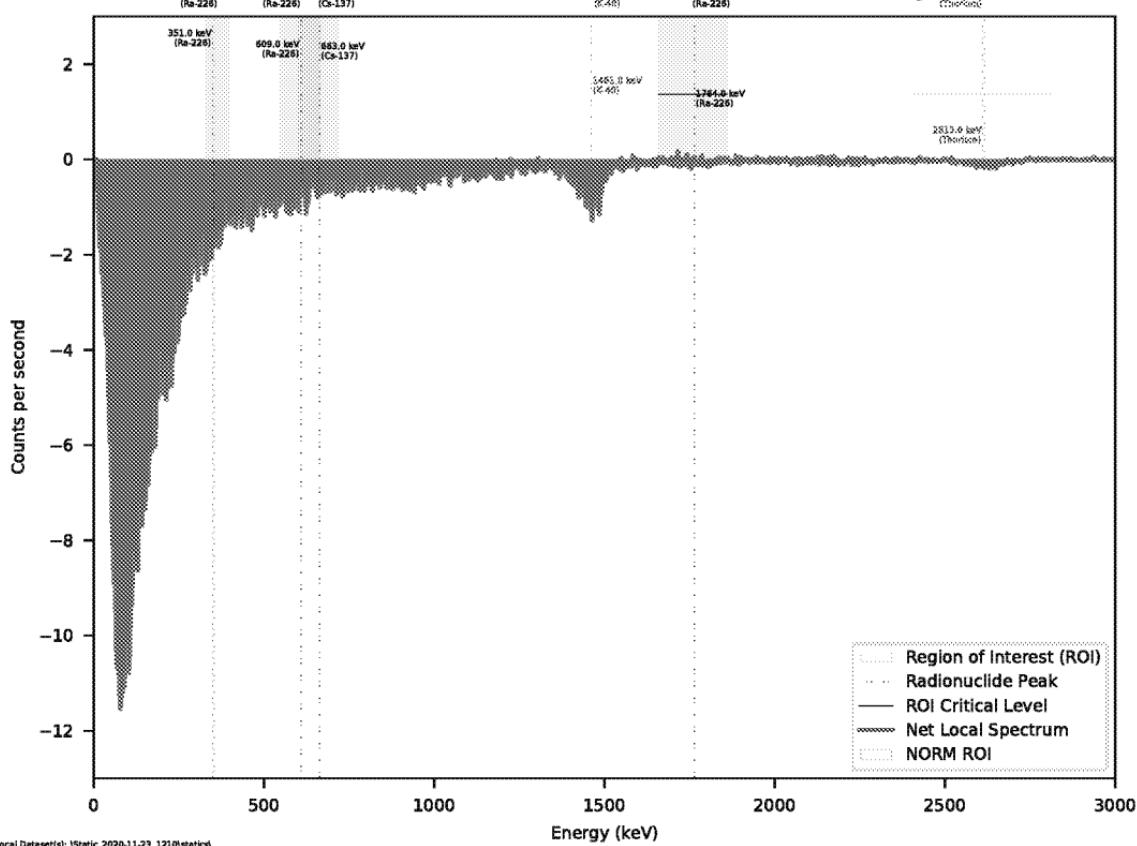
Local Dataset(s): lstatic\_2020-11-23\_1210/static/  
Background Dataset(s): RSII\_SoilRBA\_Static.csv

Local Coordinates (Longitude, Latitude): -122.36446301014492, 37.724020050724626

ED\_006360A\_00000377-00043

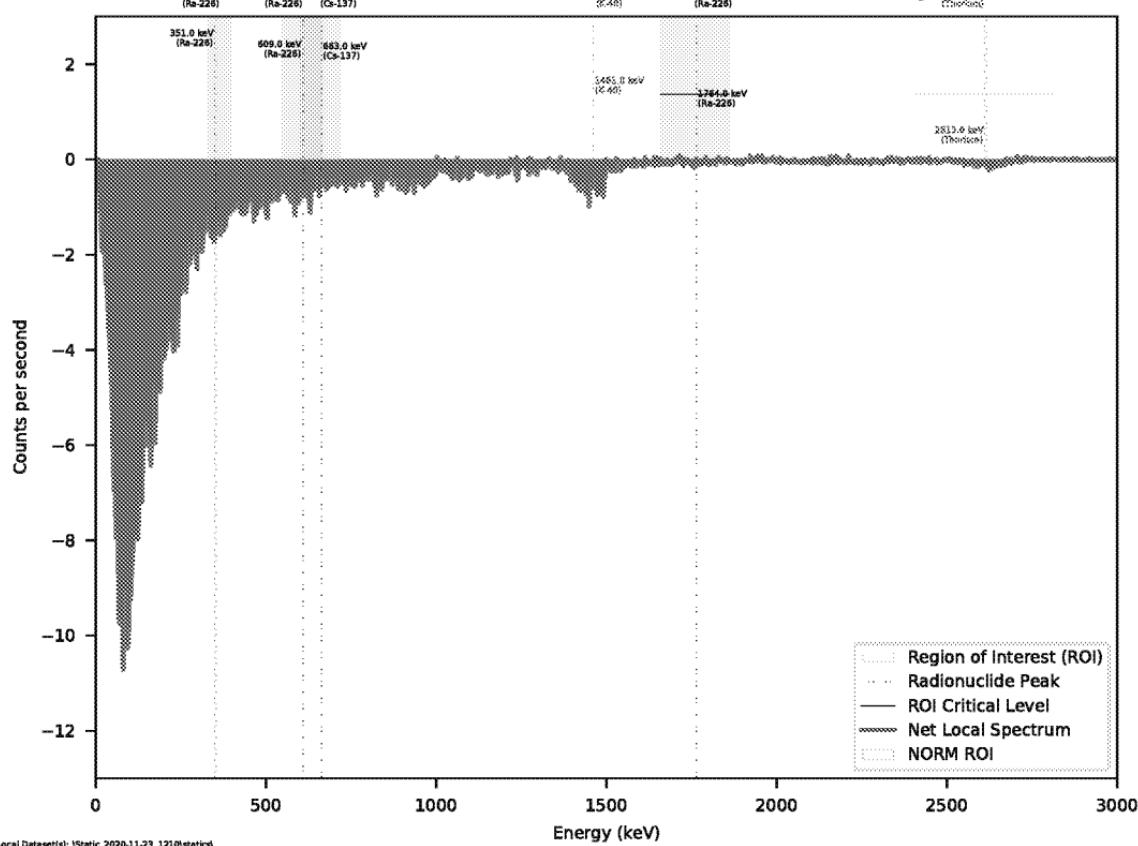
## Net Gamma Spectrum, Static Location: 31

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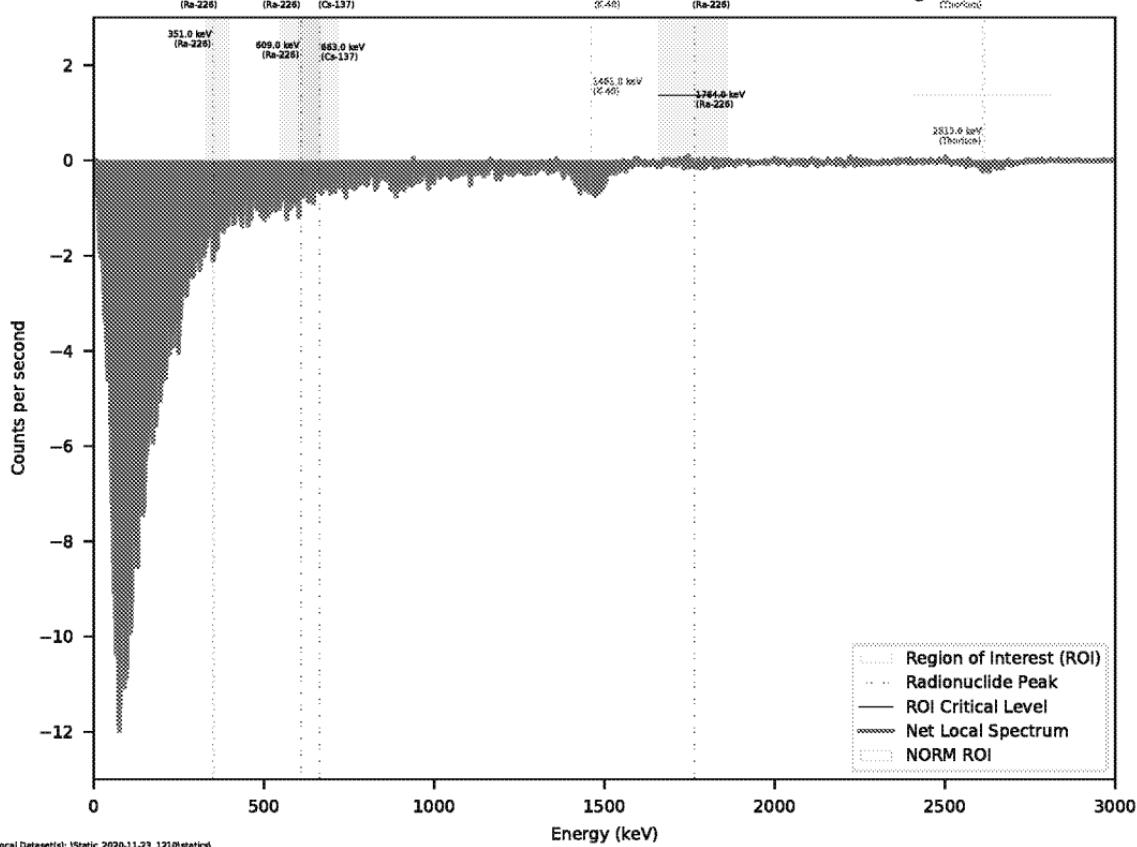
## Net Gamma Spectrum, Static Location: 32

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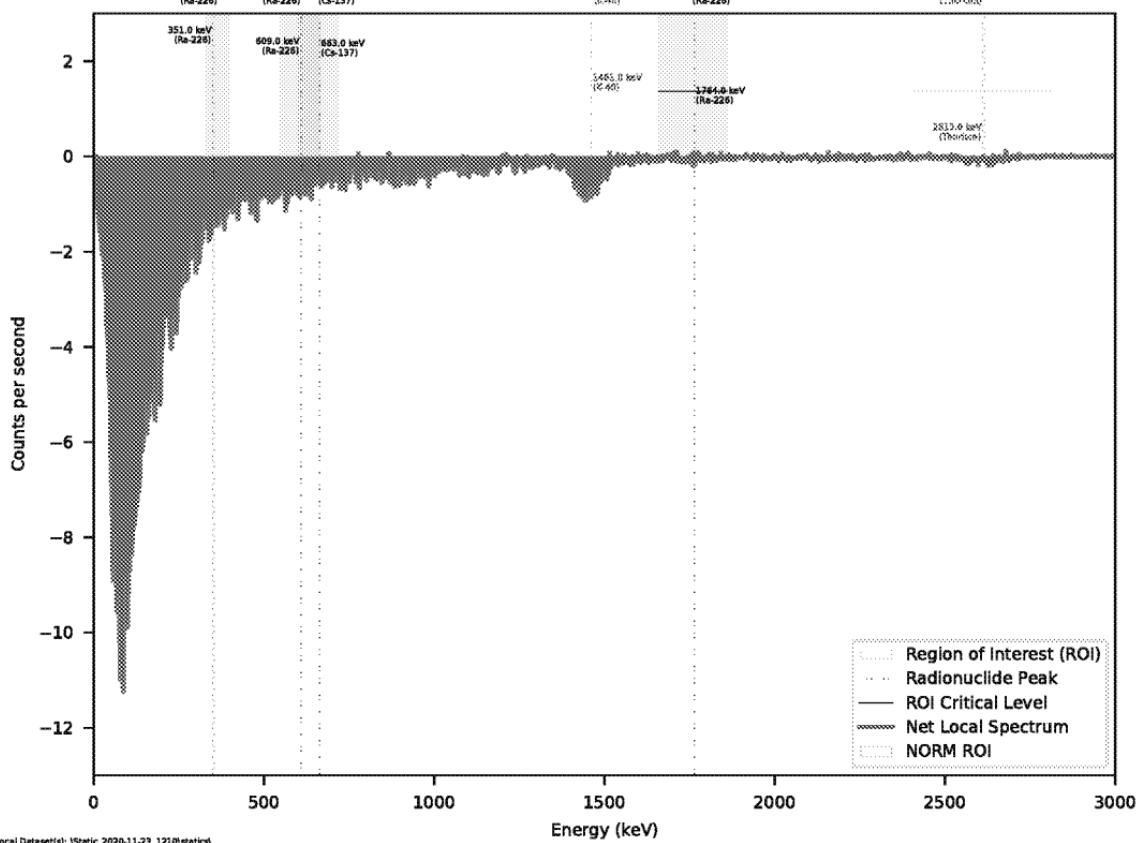
## Net Gamma Spectrum, Static Location: 33

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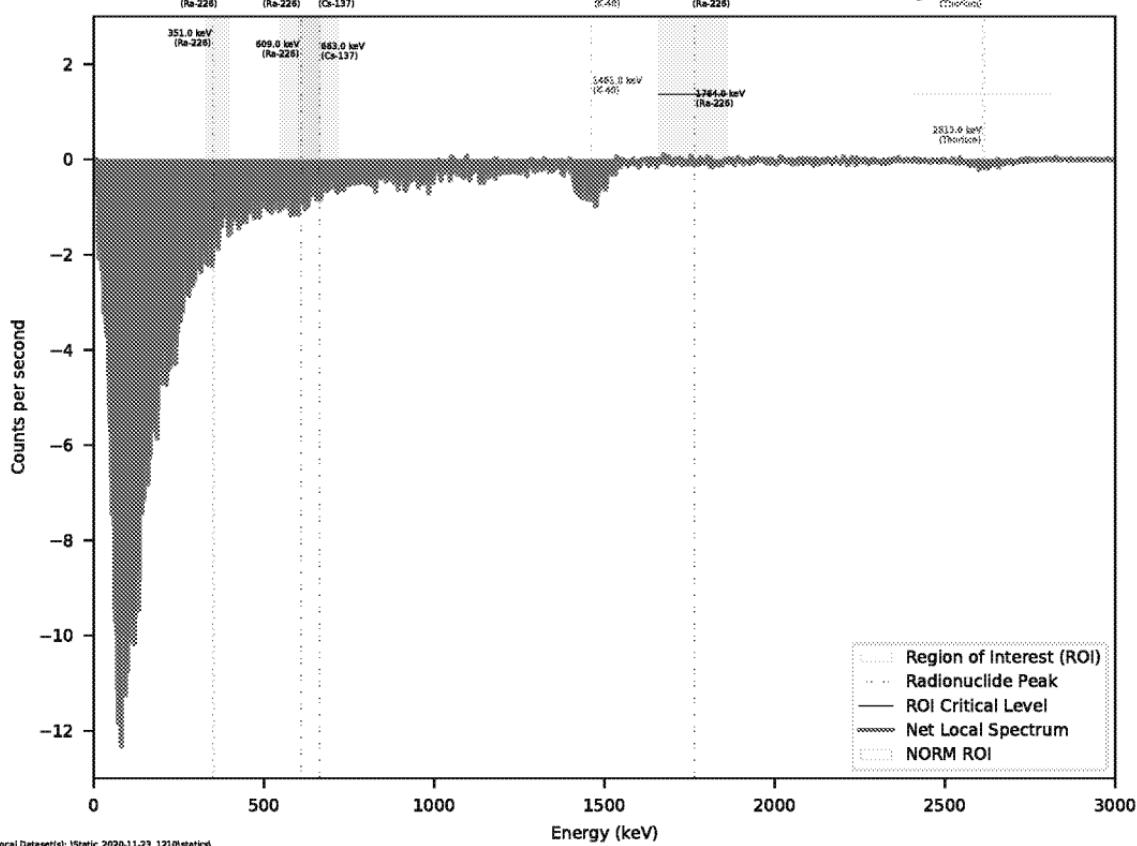
## Net Gamma Spectrum, Static Location: 34

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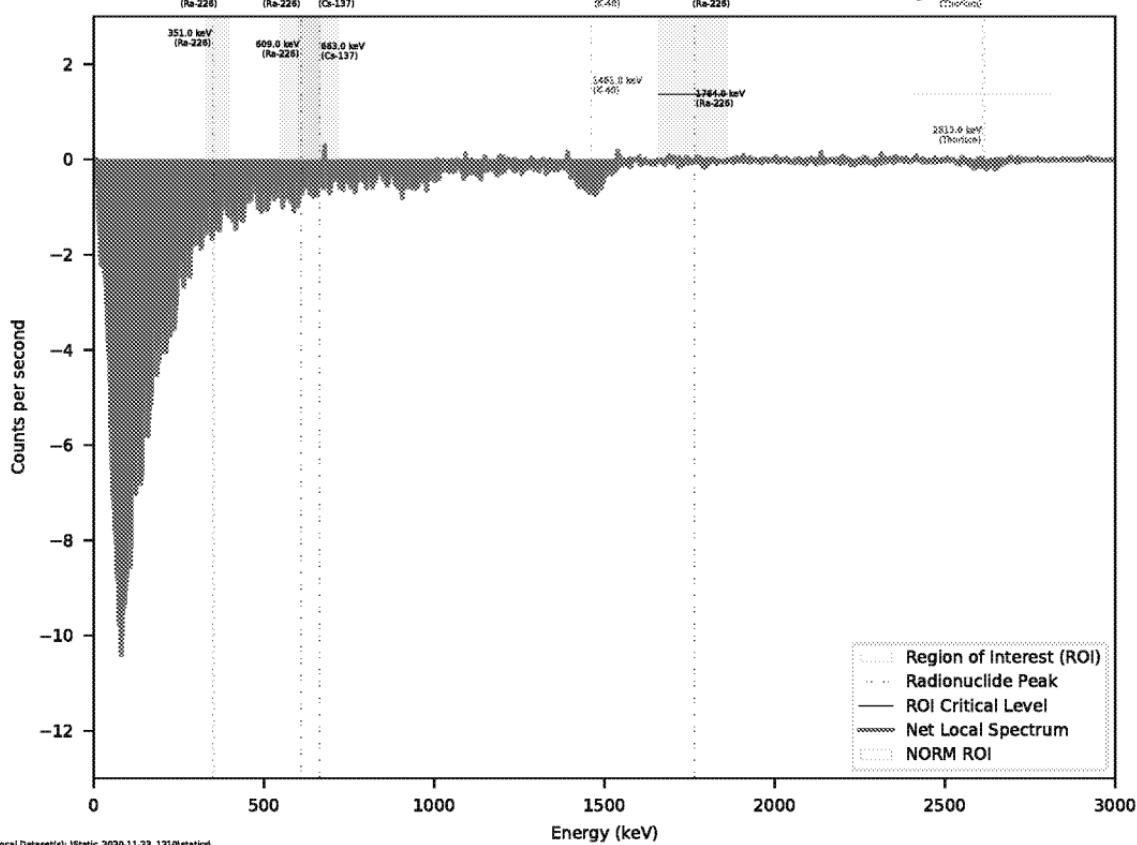
## Net Gamma Spectrum, Static Location: 35

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## Net Gamma Spectrum, Static Location: 36

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## Environment Testing America

### ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40590-1  
Laboratory Sample Delivery Group: GJ46599766  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 3

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

Authorized for release by:  
4/12/2021 4:45:37 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

#### LINKS

Review your project  
results through

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Have a Question?

Ask—  
The  
Expert

Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Job ID: 160-40590-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

**Narrative**

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40590-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Incorrect GFPC blue monthly background, correct background and results reported in revision.

Revision 2- J flags applied to samples HPPG-SFU-TU108A-011 (160-40590-13) and HPPG-SFU-TU108A-021 (160-40590-23)

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

## Job ID: 160-40590-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Revision 3- Additional information requested in case narrative for total strontium

#### RECEIPT

The samples were received on 11/27/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.1 C.

#### STRONTIUM-90 (GFPC)

Samples HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-011 (160-40590-13) and HPPG-SFU-TU108A-021 (160-40590-23) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/30/2020, prepared on 12/03/2020 and analyzed on 12/14/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-490804/22-A)

The strontium carrier recovery is outside the lower control limit (40%) for the following sample: (160-39992-A-30-D DU). The detection goal was not met for these samples due to the low carrier recovery from the presence of matrix interference apparent during the initial preparation of the sample. The QC associated with these samples fell within acceptable criteria demonstrating acceptable preparation and instrument performance. The data have been reported with this narrative.

The laboratory control sample (LCS) associated with the following samples falls below the lower limit for spike criteria (recovery is 74%; criteria is 75-125%): HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-011 (160-40590-13), HPPG-SFU-TU108A-021 (160-40590-23), (160-39992-A-30-C) and (160-39992-A-30-D DU). The other QC associated with this batch (MB, RER for duplicate precision, carrier recoveries associated) fall within acceptable criteria demonstrating acceptable preparation and instrument performance. The LCS recovery is within statistical limits of 59-124%. The data have been reported with this narrative by client approval.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-011 (160-40590-13) and HPPG-SFU-TU108A-021 (160-40590-23).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-F-043 (160-40590-1), HPPG-F-044 (160-40590-2), HPPG-SFU-TU108A-001 (160-40590-3), HPPG-SFU-TU108A-002 (160-40590-4), HPPG-SFU-TU108A-003 (160-40590-5), HPPG-SFU-TU108A-004 (160-40590-6), HPPG-SFU-TU108A-005 (160-40590-7), HPPG-SFU-TU108A-006 (160-40590-8), HPPG-SFU-TU108A-007 (160-40590-9), HPPG-SFU-TU108A-008 (160-40590-10), HPPG-SFU-TU108A-009 (160-40590-11), HPPG-SFU-TU108A-010 (160-40590-12), HPPG-SFU-TU108A-011 (160-40590-13), HPPG-SFU-TU108A-012 (160-40590-14), HPPG-SFU-TU108A-013 (160-40590-15), HPPG-SFU-TU108A-014 (160-40590-16), HPPG-SFU-TU108A-015 (160-40590-17), HPPG-SFU-TU108A-016 (160-40590-18), HPPG-SFU-TU108A-017 (160-40590-19), HPPG-SFU-TU108A-018 (160-40590-20), HPPG-SFU-TU108A-019 (160-40590-21), HPPG-SFU-TU108A-020 (160-40590-22), HPPG-SFU-TU108A-021 (160-40590-23), HPPG-SFU-TU108A-022 (160-40590-24), HPPG-SFU-TU108A-023 (160-40590-25), HPPG-SFU-TU108A-024 (160-40590-26) and HPPG-SFU-TU108A-025 (160-40590-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/30/2020, prepared on 12/02/2020 and 12/03/2020 and analyzed on 12/23/2020 and 12/24/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216

## Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

### Job ID: 160-40590-1 (Continued)

#### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

#### Gamma prep batch 490768

The method blank (MB) z-score is within limits and is stored in the level IV raw data.(MB 160-490768/1-A)

#### Gamma prep batch 490771

The MB z-score for Bi-214/Ra-226 associated with Prep Batch 160-490771 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-490771/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met for the duplicate associated with Prep Batch 160-490771: 160-40585-A-1-C DU. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The radium-226 detection goal of 0.200 pCi/g was not met for sample HPPG-SFU-TU108A-004 (160-40590-6) in batch 160-490771. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

#### Gamma prep batch 490802

The method blank (MB 160-490802/1-A) z-score associated with Prep Batch 160-490802 is within limits and is stored in the level IV raw data.

#### Gamma prep batch 490785

The method blank (MB 160-490785/1-A) z-score associated with Prep Batch 160-490785 is within limits and is stored in the level IV raw data.

The cesium-137 detection goal of 0.0700 pCi/g was not met for sample HPPG-SFU-TU108A-015 (160-40590-17) in batch 160-490785. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The following sample in batch 160-490785 exhibited a negative result greater in magnitude than the 3 sigma TPU for U-235: HPPG-SFU-TU108A-015 (160-40590-17). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-040

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

Page 6 of 36

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 11/25/2020

Waybill Number: 495702256218

Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #

Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information				Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Speciation: 90 (EPA 9011 M) - Full 21 day In Growth Gamma	Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method											
HPPG-F-043	11/23/2020	11:43	G		SO	1			16 oz. plastic jar	X			4	GJ46599766
HPPG-F-044	11/23/2020	12:08	G		SO	1			16 oz. plastic jar	X			4	GJ46599766
HPPG-SFU-TU108A-001	11/23/2020	11:22	G		SO	1			16 oz. plastic jar	X	X		4	GJ46599766
HPPG-SFU-TU108A-002	11/23/2020	11:20	G		SO	1			16 oz. plastic jar	X			4	GJ46599766
HPPG-SFU-TU108A-003	11/23/2020	11:23	G		SO	1			16 oz. plastic jar	X			4	GJ46599766
HPPG-SFU-TU108A-004	11/23/2020	11:28	G		SO	1			16 oz. plastic jar	X			4	GJ46599766
HPPG-SFU-TU108A-005	11/23/2020	11:26	G		SO	1			16 oz. plastic jar	X			4	GJ46599766
HPPG-SFU-TU108A-006	11/23/2020	11:25	G		SO	1			16 oz. plastic jar	X			4	GJ46599766

## Special Instructions:

21 day ingrowth results only

Turnaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; SO = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:

Relinquisher Signature:

Relinquish Date Time:

Received By:

Received Signature:

Receive Date Time:

Lewis, Devin		11/23/2020 17:07	Locked Storage(Kevin Hoch)		11/23/2020 17:07
Locked Storage(Kevin Hoch)		11/25/2020 07:36	Devin Lewis		11/25/2020 07:36
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB		11/29/2020 09:12

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*

MICHAEL KORRIN HIZER



ED\_006360A\_00000377-00055



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-040

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Berck.  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

Project Number: 501197

Hunters Point Naval Shipyard: Parcel

Project Name: G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 11/25/2020

Waybill Number: 4957 0225 6218

Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Destination: Rhoeda Ridenbower (314)298-8566

Lab Contact Name/ph #

Preservatives (water)

Preservatives (soil)

Container Type

Matrix

# of Containers

Storage Spec (EPA 9011 M) - Full 21 day in glass jar with gamma

Storage Spec (EPA 905 MWD)

Dose Rate uR/Hr

Evidence Bag ID

Comment

Sample ID	Collection Information				Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Storage Spec (EPA 9011 M) - Full 21 day in glass jar with gamma	Storage Spec (EPA 905 MWD)	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method	SO										
HPPG-SFU-TU108A-007	11/23/2020	11:22	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-008	11/23/2020	11:36	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-009	11/23/2020	11:40	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-010	11/23/2020	11:32	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-011	11/23/2020	11:34	G	SO	1	16 oz. plastic jar	X	X				4	GJ46599766	
HPPG-SFU-TU108A-012	11/23/2020	11:37	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-013	11/23/2020	11:42	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-014	11/23/2020	11:43	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-015	11/23/2020	11:34	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-016	11/23/2020	11:40	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-017	11/23/2020	11:45	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-018	11/23/2020	11:47	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-019	11/23/2020	11:52	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-020	11/23/2020	11:49	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-021	11/23/2020	11:53	G	SO	1	16 oz. plastic jar	X	X				4	GJ46599766	
HPPG-SFU-TU108A-022	11/23/2020	11:45	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-023	11/23/2020	12:08	G	SO	1	16 oz. plastic jar	X					4	GJ46599766	



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-040

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

Project Number: 501197

Hunters Point Naval Shipyard: Parcel

Project Name: G Remedial Action

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Waybill Number: 4457 0225 6218

Test America (St. Louis Lab)

Lab Destination: 13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #

Rhoeda Ridenbower (314)298-8566

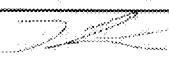
Preservatives (water)

Preservatives (soil)

	Collection Information	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment
		Matrix	# of Containers	Sample Spec (EPA 901.1, M - EPA 2424)	Sample Spec (EPA 905 (GOM))	Sample Spec (EPA 901.1, M - EPA 2424)	Sample Spec (EPA 905 (GOM))			
HPPG-SFU-TU108A-024	11/23/2020 11:57 G SO 1	16 oz. plastic jar	X					4	GJ46599766	
HPPG-SFU-TU108A-025	11/23/2020 12:02 G SO 1	16 oz. plastic jar	X					4	GJ46599766	



## All Transfers for COC 501197RSY-040

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/23/2020 17:07	Locked Storage(Kevin Hoch)		11/23/2020 17:07
Locked Storage(Kevin Hoch)		11/25/2020 07:36	Devin Lewis		11/25/2020 07:36
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB	 MICHAEL KORRIN HIZER	11/27/2020 07:12

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40590-1  
SDG Number: GJ46599766**Login Number:** 40590**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Greer, Diane A

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

## Qualifiers

Rad Qualifier	Qualifier Description
J	Estimated: The quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

## Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

## Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40590-1	HPPG-F-043	Solid	11/23/20 11:43	11/27/20 09:12	
160-40590-2	HPPG-F-044	Solid	11/23/20 12:08	11/27/20 09:12	
160-40590-3	HPPG-SFU-TU108A-001	Solid	11/23/20 11:22	11/27/20 09:12	
160-40590-4	HPPG-SFU-TU108A-002	Solid	11/23/20 11:20	11/27/20 09:12	
160-40590-5	HPPG-SFU-TU108A-003	Solid	11/23/20 11:23	11/27/20 09:12	
160-40590-6	HPPG-SFU-TU108A-004	Solid	11/23/20 11:28	11/27/20 09:12	
160-40590-7	HPPG-SFU-TU108A-005	Solid	11/23/20 11:26	11/27/20 09:12	
160-40590-8	HPPG-SFU-TU108A-006	Solid	11/23/20 11:25	11/27/20 09:12	
160-40590-9	HPPG-SFU-TU108A-007	Solid	11/23/20 11:22	11/27/20 09:12	
160-40590-10	HPPG-SFU-TU108A-008	Solid	11/23/20 11:36	11/27/20 09:12	
160-40590-11	HPPG-SFU-TU108A-009	Solid	11/23/20 11:40	11/27/20 09:12	
160-40590-12	HPPG-SFU-TU108A-010	Solid	11/23/20 11:32	11/27/20 09:12	
160-40590-13	HPPG-SFU-TU108A-011	Solid	11/23/20 11:34	11/27/20 09:12	
160-40590-14	HPPG-SFU-TU108A-012	Solid	11/23/20 11:37	11/27/20 09:12	
160-40590-15	HPPG-SFU-TU108A-013	Solid	11/23/20 11:42	11/27/20 09:12	
160-40590-16	HPPG-SFU-TU108A-014	Solid	11/23/20 11:43	11/27/20 09:12	
160-40590-17	HPPG-SFU-TU108A-015	Solid	11/23/20 11:34	11/27/20 09:12	
160-40590-18	HPPG-SFU-TU108A-016	Solid	11/23/20 11:40	11/27/20 09:12	
160-40590-19	HPPG-SFU-TU108A-017	Solid	11/23/20 11:45	11/27/20 09:12	
160-40590-20	HPPG-SFU-TU108A-018	Solid	11/23/20 11:47	11/27/20 09:12	
160-40590-21	HPPG-SFU-TU108A-019	Solid	11/23/20 11:52	11/27/20 09:12	
160-40590-22	HPPG-SFU-TU108A-020	Solid	11/23/20 11:49	11/27/20 09:12	
160-40590-23	HPPG-SFU-TU108A-021	Solid	11/23/20 11:53	11/27/20 09:12	
160-40590-24	HPPG-SFU-TU108A-022	Solid	11/23/20 11:45	11/27/20 09:12	
160-40590-25	HPPG-SFU-TU108A-023	Solid	11/23/20 12:08	11/27/20 09:12	
160-40590-26	HPPG-SFU-TU108A-024	Solid	11/23/20 11:57	11/27/20 09:12	
160-40590-27	HPPG-SFU-TU108A-025	Solid	11/23/20 12:02	11/27/20 09:12	

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-F-043**

Date Collected: 11/23/20 11:43  
Date Received: 11/27/20 09:12

**Lab Sample ID: 160-40590-1**

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.287		0.154	0.157		0.107	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Actinium-227	-0.299	U	0.597	0.598		0.361	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Bismuth-212	0.000	U	0.373	0.373		0.351	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Bismuth-214</b>	<b>0.251</b>		0.0912	0.0949		0.0450	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Cesium-137	0.0241	U	0.0489	0.0490	0.0700	0.0379	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Lead-210</b>	<b>0.768</b>		1.02	1.03		0.696	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Lead-212</b>	<b>0.250</b>		0.0704	0.0775		0.0385	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Lead-214</b>	<b>0.268</b>		0.0891	0.0933		0.0495	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Potassium-40</b>	<b>6.82</b>		1.10	1.31		0.231	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Protactinium-231	0.0000000	U	2.20	2.20		1.82	pCi/g	12/02/20 14:03	12/23/20 11:22	1
918										
Protactinium-234	-0.0170	U	0.0307	0.0308		0.221	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Radium-226</b>	<b>0.251</b>		0.0912	0.0949	0.200	0.0450	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Radium-228</b>	<b>0.287</b>		0.154	0.157		0.107	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Thallium-208</b>	<b>0.103</b>		0.0370	0.0385		0.0131	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Thorium 228</b>	<b>0.250</b>		0.0704	0.0775		0.0385	pCi/g	12/02/20 14:03	12/23/20 11:22	1
<b>Thorium-232</b>	<b>0.287</b>		0.154	0.157		0.107	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Thorium-234	-0.741	U	0.506	0.513		0.506	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Uranium-235	-0.0334	U	0.112	0.112		0.456	pCi/g	12/02/20 14:03	12/23/20 11:22	1
Uranium-238	-0.741	U	0.506	0.513		0.506	pCi/g	12/02/20 14:03	12/23/20 11:22	1

**Client Sample ID: HPPG-F-044**

Date Collected: 11/23/20 12:08  
Date Received: 11/27/20 09:12

**Lab Sample ID: 160-40590-2**

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.215		0.190	0.191		0.0936	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Actinium-227	-0.0927	U	0.306	0.306		0.268	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Bismuth-212	-0.0270	U	0.431	0.431		0.411	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Bismuth-214</b>	<b>0.258</b>		0.0772	0.0818		0.0322	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Cesium-137	-0.0111	U	0.0434	0.0434	0.0700	0.0347	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Lead-210	-0.337	U	1.26	1.26		1.02	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Lead-212</b>	<b>0.279</b>		0.0679	0.0769		0.0372	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Lead-214</b>	<b>0.297</b>		0.0757	0.0817		0.0373	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Potassium-40</b>	<b>7.64</b>		1.08	1.33		0.235	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Protactinium-231	0.000	U	0.323	0.323		1.61	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Protactinium-234	0.102	U	0.168	0.168		0.137	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Radium-226</b>	<b>0.258</b>		0.0772	0.0818	0.200	0.0322	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Radium-228</b>	<b>0.215</b>		0.190	0.191		0.0936	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Thallium-208</b>	<b>0.124</b>		0.0354	0.0376		0.00996	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Thorium 228</b>	<b>0.279</b>		0.0679	0.0769		0.0372	pCi/g	12/02/20 14:03	12/23/20 10:36	1
<b>Thorium-232</b>	<b>0.215</b>		0.190	0.191		0.0936	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Thorium-234	0.288	U	0.478	0.479		0.310	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Uranium-235	0.119	U	0.222	0.223		0.281	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Uranium-238	0.288	U	0.478	0.479		0.310	pCi/g	12/02/20 14:03	12/23/20 10:36	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-001**

**Lab Sample ID: 160-40590-3**

Date Collected: 11/23/20 11:22

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.0138	U J	0.115	0.115	0.331	0.0957	pCi/g	12/03/20 11:35	12/14/20 17:10	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	104		40 - 110					12/03/20 11:35	12/14/20 17:10	1
Y Carrier	90.5		40 - 110					12/03/20 11:35	12/14/20 17:10	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Actinium 228	0.101	U	0.0605	0.0614		0.148	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Actinium-227	-0.281	U	0.546	0.547		0.316	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Bismuth-212	0.0291	U	0.574	0.574		0.470	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
<b>Bismuth-214</b>	<b>0.312</b>		0.102	0.107		0.0469	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Cesium-137	-0.0223	U	0.0603	0.0603	0.0700	0.0482	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Lead-210	-2.41	U	4.83	4.84		3.95	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
<b>Lead-212</b>	<b>0.347</b>		0.0658	0.0796		0.0277	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
<b>Lead-214</b>	<b>0.308</b>		0.0774	0.0838		0.0388	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
<b>Potassium-40</b>	<b>6.90</b>		0.991	1.22		0.0829	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Protactinium-231	0.402	U		1.47	1.47		1.64	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Protactinium-234	0.0768	U	0.0681	0.0685		0.197	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
<b>Radium-226</b>	<b>0.312</b>		0.102	0.107	0.200	0.0469	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Radium-228	0.101	U	0.0605	0.0614		0.148	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
<b>Thallium-208</b>	<b>0.162</b>		0.0496	0.0524		0.0157	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
<b>Thorium 228</b>	<b>0.347</b>		0.0658	0.0796		0.0277	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Thorium-232	0.101	U	0.0605	0.0614		0.148	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Thorium-234	0.225	U		0.351	0.352		0.931	pCi/g	12/02/20 14:03	12/23/20 10:36	1
Uranium-235	0.0462	U	0.0901	0.0902		0.327	pCi/g	12/02/20 14:03	12/23/20 10:36	1	
Uranium-238	0.225	U		0.351	0.352		0.931	pCi/g	12/02/20 14:03	12/23/20 10:36	1

**Client Sample ID: HPPG-SFU-TU108A-002**

**Lab Sample ID: 160-40590-4**

Date Collected: 11/23/20 11:20

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
			Uncert. (2σ+/-)	Uncert. (2σ+/-)							
Actinium 228	0.310		0.231	0.233		0.126	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
Actinium-227	0.249	U	0.539	0.540		0.321	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
Bismuth-212	-0.317	U	0.548	0.549		0.788	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
<b>Bismuth-214</b>	<b>0.365</b>		0.151	0.156		0.0819	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
Cesium-137	0.0116	U	0.0640	0.0640	0.0700	0.0511	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
<b>Lead-210</b>	<b>0.858</b>		1.03	1.03		0.677	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
<b>Lead-212</b>	<b>0.388</b>		0.0932	0.106		0.0421	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
<b>Lead-214</b>	<b>0.202</b>		0.136	0.138		0.0790	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
<b>Potassium-40</b>	<b>7.99</b>		1.72	1.91		0.476	pCi/g	12/02/20 14:03	12/23/20 10:02	1	
Protactinium-231	-0.851	U		2.37	2.38		1.91	pCi/g	12/02/20 14:03	12/23/20 10:02	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-002**

**Lab Sample ID: 160-40590-4**

Date Collected: 11/23/20 11:20

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0830	U	0.115	0.115		0.182	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Radium-226	0.365		0.151	0.156	0.200	0.0819	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Radium-228	0.310		0.231	0.233		0.126	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thallium-208	0.145		0.0740	0.0756		0.0316	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium 228	0.388		0.0932	0.106		0.0421	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium-232	0.310		0.231	0.233		0.126	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Thorium-234	0.364	U	0.511	0.513		0.394	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Uranium-235	0.0706	U	0.168	0.168		0.307	pCi/g	12/02/20 14:03	12/23/20 10:02	1
Uranium-238	0.364	U	0.511	0.513		0.394	pCi/g	12/02/20 14:03	12/23/20 10:02	1

**Client Sample ID: HPPG-SFU-TU108A-003**

**Lab Sample ID: 160-40590-5**

Date Collected: 11/23/20 11:23

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.234		0.234	0.235		0.135	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Actinium-227	0.0121	U	0.0210	0.0211		0.384	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Bismuth-212	0.196	U	0.597	0.598		0.471	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Bismuth-214	0.487		0.121	0.131		0.0398	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Cesium-137	0.00960	U	0.0506	0.0506	0.0700	0.0406	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Lead-210	0.478	U	1.33	1.33		0.860	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Lead-212	0.357		0.0836	0.0955		0.0418	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Lead-214	0.418		0.114	0.122		0.0444	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Potassium-40	8.19		1.28	1.53		0.259	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Protactinium-231	0.545	U	1.73	1.73		1.89	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Protactinium-234	-0.0367	U	0.0856	0.0857		0.247	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Radium-226	0.487		0.121	0.131	0.200	0.0398	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Radium-228	0.234		0.234	0.235		0.135	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thallium-208	0.115		0.0429	0.0446		0.0147	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thorium 228	0.357		0.0836	0.0955		0.0418	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thorium-232	0.234		0.234	0.235		0.135	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Thorium-234	0.768		0.708	0.714		0.439	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Uranium-235	-0.0679	U	0.181	0.181		0.489	pCi/g	12/02/20 15:05	12/23/20 06:34	1
Uranium-238	0.768		0.708	0.714		0.439	pCi/g	12/02/20 15:05	12/23/20 06:34	1

**Client Sample ID: HPPG-SFU-TU108A-004**

**Lab Sample ID: 160-40590-6**

Date Collected: 11/23/20 11:28

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.379		0.268	0.272		0.116	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Actinium-227	0.0210	U	0.563	0.563		0.350	pCi/g	12/02/20 15:05	12/23/20 07:09	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-004**

**Lab Sample ID: 160-40590-6**

Date Collected: 11/23/20 11:28

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.000	U	0.384	0.384		0.621	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Bismuth-214	0.0240	U	0.262	0.262		0.214	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Cesium-137	-0.0261	U	0.0659	0.0660	0.0700	0.0515	pCi/g	12/02/20 15:05	12/23/20 07:09	1
<b>Lead-210</b>	<b>1.52</b>		1.60	1.61		1.01	pCi/g	12/02/20 15:05	12/23/20 07:09	1
<b>Lead-212</b>	<b>0.213</b>		0.0819	0.0856		0.0399	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Lead-214	0.0190	U	0.139	0.139		0.113	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Potassium-40	6.34		1.31	1.50		0.325	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Protactinium-231	-1.06	U	3.85	3.85		3.14	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Protactinium-234	0.0271	U	0.0530	0.0531		0.259	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Radium-226	0.0240	U	0.262	0.262	0.200	0.214	pCi/g	12/02/20 15:05	12/23/20 07:09	1
<b>Radium-228</b>	<b>0.379</b>		0.268	0.272		0.116	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Thallium-208	0.0802		0.0785	0.0791		0.0419	pCi/g	12/02/20 15:05	12/23/20 07:09	1
<b>Thorium 228</b>	<b>0.213</b>		0.0819	0.0856		0.0399	pCi/g	12/02/20 15:05	12/23/20 07:09	1
<b>Thorium-232</b>	<b>0.379</b>		0.268	0.272		0.116	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Thorium-234	0.144	U	0.556	0.557		0.443	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Uranium-235	-0.246	U	0.124	0.127		0.533	pCi/g	12/02/20 15:05	12/23/20 07:09	1
Uranium-238	0.144	U	0.556	0.557		0.443	pCi/g	12/02/20 15:05	12/23/20 07:09	1

**Client Sample ID: HPPG-SFU-TU108A-005**

**Lab Sample ID: 160-40590-7**

Date Collected: 11/23/20 11:26

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.295		0.126	0.129		0.126	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Actinium-227	0.169	U	0.375	0.375		0.224	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Bismuth-212	0.174	U	0.406	0.406		0.308	pCi/g	12/02/20 15:05	12/23/20 06:37	1
<b>Bismuth-214</b>	<b>0.326</b>		0.0890	0.0952		0.0220	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Cesium-137	0.0141	U	0.0334	0.0334	0.0700	0.0255	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Lead-210	0.612	U	1.43	1.43		0.892	pCi/g	12/02/20 15:05	12/23/20 06:37	1
<b>Lead-212</b>	<b>0.350</b>		0.0800	0.0919		0.0416	pCi/g	12/02/20 15:05	12/23/20 06:37	1
<b>Lead-214</b>	<b>0.472</b>		0.106	0.117		0.0372	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Potassium-40	7.77		1.18	1.43		0.268	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Protactinium-231	-0.805	U	2.72	2.72		2.22	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Protactinium-234	-0.0199	U	0.0486	0.0486		0.169	pCi/g	12/02/20 15:05	12/23/20 06:37	1
<b>Radium-226</b>	<b>0.326</b>		0.0890	0.0952	0.200	0.0220	pCi/g	12/02/20 15:05	12/23/20 06:37	1
<b>Radium-228</b>	<b>0.295</b>		0.126	0.129		0.126	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Thallium-208	0.157		0.0438	0.0468		0.0131	pCi/g	12/02/20 15:05	12/23/20 06:37	1
<b>Thorium 228</b>	<b>0.350</b>		0.0800	0.0919		0.0416	pCi/g	12/02/20 15:05	12/23/20 06:37	1
<b>Thorium-232</b>	<b>0.295</b>		0.126	0.129		0.126	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Thorium-234	-0.340	U	0.489	0.490		0.631	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Uranium-235	-0.0500	U	0.108	0.108		0.259	pCi/g	12/02/20 15:05	12/23/20 06:37	1
Uranium-238	-0.340	U	0.489	0.490		0.631	pCi/g	12/02/20 15:05	12/23/20 06:37	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-006**

**Lab Sample ID: 160-40590-8**

Matrix: Solid

Date Collected: 11/23/20 11:25  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.619		0.143	0.156		0.0315	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Actinium-227	0.123	U	0.593	0.594		0.364	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Bismuth-212	0.336	U	0.650	0.651		0.497	pCi/g	12/03/20 09:54	12/24/20 16:58	1
<b>Bismuth-214</b>	<b>0.418</b>		0.128	0.134		0.0557	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Cesium-137	-0.0304	U	0.0598	0.0598	0.0700	0.0461	pCi/g	12/03/20 09:54	12/24/20 16:58	1
<b>Lead-210</b>	<b>1.54</b>		1.78	1.79		1.08	pCi/g	12/03/20 09:54	12/24/20 16:58	1
<b>Lead-212</b>	<b>0.382</b>		0.0976	0.105		0.0541	pCi/g	12/03/20 09:54	12/24/20 16:58	1
<b>Lead-214</b>	<b>0.372</b>		0.108	0.114		0.0578	pCi/g	12/03/20 09:54	12/24/20 16:58	1
<b>Potassium-40</b>	<b>8.86</b>		1.36	1.63		0.122	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Protactinium-231	0.000	U	0.294	0.294		2.36	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Protactinium-234	-0.106	U	0.331	0.331		0.269	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Radium-226	0.418		0.128	0.134	0.200	0.0557	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Radium-228	0.619		0.143	0.156		0.0315	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thallium-208	0.183		0.0570	0.0600		0.0139	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thorium 228	0.382		0.0976	0.105		0.0541	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thorium-232	0.619		0.143	0.156		0.0315	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Thorium-234	0.490		0.650	0.652		0.425	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Uranium-235	0.0350	U	0.0512	0.0513		0.495	pCi/g	12/03/20 09:54	12/24/20 16:58	1
Uranium-238	0.490		0.650	0.652		0.425	pCi/g	12/03/20 09:54	12/24/20 16:58	1

**Client Sample ID: HPPG-SFU-TU108A-007**

**Lab Sample ID: 160-40590-9**

Matrix: Solid

Date Collected: 11/23/20 11:22  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.176		0.177	0.178		0.0954	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Actinium-227	0.170	U	0.256	0.257		0.234	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Bismuth-212	0.000	U	0.389	0.389		0.294	pCi/g	12/03/20 09:54	12/24/20 16:59	1
<b>Bismuth-214</b>	<b>0.267</b>		0.0865	0.0909		0.0393	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Cesium-137	-0.0319	U	0.0578	0.0579	0.0700	0.0456	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Lead-210	-0.563	U	1.22	1.22		0.981	pCi/g	12/03/20 09:54	12/24/20 16:59	1
<b>Lead-212</b>	<b>0.312</b>		0.0647	0.0763		0.0326	pCi/g	12/03/20 09:54	12/24/20 16:59	1
<b>Lead-214</b>	<b>0.314</b>		0.0723	0.0793		0.0383	pCi/g	12/03/20 09:54	12/24/20 16:59	1
<b>Potassium-40</b>	<b>8.40</b>		1.04	1.35		0.0753	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Protactinium-231	0.421	U	1.31	1.31		1.41	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Protactinium-234	-0.0242	U	0.0563	0.0563		0.171	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Radium-226	0.267		0.0865	0.0909	0.200	0.0393	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Radium-228	0.176		0.177	0.178		0.0954	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Thallium-208	0.0828		0.0448	0.0457		0.0202	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Thorium 228	0.312		0.0647	0.0763		0.0326	pCi/g	12/03/20 09:54	12/24/20 16:59	1
<b>Thorium-232</b>	<b>0.176</b>		0.177	0.178		0.0954	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Thorium-234	0.162	U	0.378	0.378		0.711	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Uranium-235	0.0498	U	0.161	0.161		0.305	pCi/g	12/03/20 09:54	12/24/20 16:59	1
Uranium-238	0.162	U	0.378	0.378		0.711	pCi/g	12/03/20 09:54	12/24/20 16:59	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-008**

**Lab Sample ID: 160-40590-10**

Date Collected: 11/23/20 11:36

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.0419	U	0.120	0.121		0.154	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Actinium-227	0.231	U	0.468	0.469		0.279	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Bismuth-212	0.280	U	0.555	0.556		0.420	pCi/g	12/03/20 09:54	12/24/20 17:00	1
<b>Bismuth-214</b>	<b>0.187</b>		0.104	0.107		0.0561	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Cesium-137	0.0196	U	0.0620	0.0620	0.0700	0.0492	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Lead-210	-1.46	U	1.47	1.49		1.28	pCi/g	12/03/20 09:54	12/24/20 17:00	1
<b>Lead-212</b>	<b>0.149</b>		0.0752	0.0772		0.0502	pCi/g	12/03/20 09:54	12/24/20 17:00	1
<b>Lead-214</b>	<b>0.203</b>		0.0916	0.0945		0.0462	pCi/g	12/03/20 09:54	12/24/20 17:00	1
<b>Potassium-40</b>	<b>6.72</b>		1.23	1.45		0.273	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Protactinium-231	0.652	U	1.94	1.94		1.57	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Protactinium-234	-0.0961	U	0.272	0.272		0.221	pCi/g	12/03/20 09:54	12/24/20 17:00	1
<b>Radium-226</b>	<b>0.187</b>		0.104	0.107	0.200	0.0561	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Radium-228	0.0419	U	0.120	0.121		0.154	pCi/g	12/03/20 09:54	12/24/20 17:00	1
<b>Thallium-208</b>	<b>0.0693</b>		0.0582	0.0588		0.0314	pCi/g	12/03/20 09:54	12/24/20 17:00	1
<b>Thorium 228</b>	<b>0.149</b>		0.0752	0.0772		0.0502	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Thorium-232	0.0419	U	0.120	0.121		0.154	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Thorium-234	-0.491	U	0.679	0.682		0.705	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Uranium-235	0.114	U	0.408	0.408		0.405	pCi/g	12/03/20 09:54	12/24/20 17:00	1
Uranium-238	-0.491	U	0.679	0.682		0.705	pCi/g	12/03/20 09:54	12/24/20 17:00	1

**Client Sample ID: HPPG-SFU-TU108A-009**

**Lab Sample ID: 160-40590-11**

Date Collected: 11/23/20 11:40

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.500		0.127	0.137		0.0253	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Actinium-227	-0.303	U	0.386	0.387		0.336	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Bismuth-212	-0.162	U	0.235	0.235		0.522	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Bismuth-214</b>	<b>0.266</b>		0.0962	0.100		0.0470	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Cesium-137	0.0209	U	0.0645	0.0645	0.0700	0.0516	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Lead-210	0.245	U	1.42	1.42		1.15	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Lead-212</b>	<b>0.403</b>		0.0792	0.0949		0.0350	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Lead-214</b>	<b>0.298</b>		0.0853	0.0908		0.0486	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Potassium-40</b>	<b>6.71</b>		1.13	1.32		0.284	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Protactinium-231	0.000	U	0.732	0.732		1.89	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Protactinium-234	0.0811	U	0.212	0.212		0.161	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Radium-226</b>	<b>0.266</b>		0.0962	0.100	0.200	0.0470	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Radium-228</b>	<b>0.500</b>		0.127	0.137		0.0253	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Thallium-208</b>	<b>0.115</b>		0.0382	0.0401		0.0121	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Thorium 228</b>	<b>0.403</b>		0.0792	0.0949		0.0350	pCi/g	12/03/20 09:54	12/24/20 19:07	1
<b>Thorium-232</b>	<b>0.500</b>		0.127	0.137		0.0253	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Thorium-234	-0.308	U	1.04	1.04		0.850	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Uranium-235	0.106	U	0.322	0.322		0.260	pCi/g	12/03/20 09:54	12/24/20 19:07	1
Uranium-238	-0.308	U	1.04	1.04		0.850	pCi/g	12/03/20 09:54	12/24/20 19:07	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-010**

**Lab Sample ID: 160-40590-12**

Date Collected: 11/23/20 11:32

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.314		0.204	0.207		0.123	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Actinium-227	0.123	U	0.485	0.485		0.296	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Bismuth-212	0.00739	U	0.558	0.558		0.458	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Bismuth-214	0.0576	U	0.169	0.169		0.161	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Cesium-137	0.0303	U	0.0598	0.0599	0.0700	0.0466	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Lead-210	1.10	U	1.44	1.45		1.13	pCi/g	12/03/20 09:54	12/24/20 17:05	1
<b>Lead-212</b>	<b>0.426</b>		0.0807	0.0977		0.0313	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Lead-214	0.382		0.102	0.109		0.0408	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Potassium-40	8.61		1.30	1.57		0.291	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Protactinium-231	0.630	U	1.91	1.91		2.08	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Protactinium-234	0.0519	U	0.0826	0.0828		0.179	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Radium-226	0.0576	U	0.169	0.169	0.200	0.161	pCi/g	12/03/20 09:54	12/24/20 17:05	1
<b>Radium-228</b>	<b>0.314</b>		0.204	0.207		0.123	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Thallium-208	0.0934		0.0608	0.0616		0.0309	pCi/g	12/03/20 09:54	12/24/20 17:05	1
<b>Thorium 228</b>	<b>0.426</b>		0.0807	0.0977		0.0313	pCi/g	12/03/20 09:54	12/24/20 17:05	1
<b>Thorium-232</b>	<b>0.314</b>		0.204	0.207		0.123	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Thorium-234	0.221	U	0.186	0.188		0.507	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Uranium-235	0.117	U	0.312	0.312		0.252	pCi/g	12/03/20 09:54	12/24/20 17:05	1
Uranium-238	0.221	U	0.186	0.188		0.507	pCi/g	12/03/20 09:54	12/24/20 17:05	1

**Client Sample ID: HPPG-SFU-TU108A-011**

**Lab Sample ID: 160-40590-13**

Date Collected: 11/23/20 11:34

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0226	U J	0.141	0.141	0.331	0.117	pCi/g	12/03/20 11:35	12/14/20 17:11	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	100		40 - 110					12/03/20 11:35	12/14/20 17:11	1
Y Carrier	90.8		40 - 110					12/03/20 11:35	12/14/20 17:11	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.172		0.253	0.253		0.137	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Actinium-227	0.235	U	0.507	0.508		0.302	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Bismuth-212	0.0460	U	0.842	0.842		0.689	pCi/g	12/03/20 09:54	12/24/20 17:04	1
<b>Bismuth-214</b>	<b>0.219</b>		0.132	0.134		0.0770	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Cesium-137	0.0121	U	0.0812	0.0813	0.0700	0.0658	pCi/g	12/03/20 09:54	12/24/20 17:04	1
<b>Lead-210</b>	<b>0.906</b>		1.02	1.03		0.654	pCi/g	12/03/20 09:54	12/24/20 17:04	1
<b>Lead-212</b>	<b>0.288</b>		0.0823	0.0904		0.0434	pCi/g	12/03/20 09:54	12/24/20 17:04	1
<b>Lead-214</b>	<b>0.192</b>		0.117	0.119		0.0649	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Potassium-40	6.22		1.26	1.41		0.148	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Protactinium-231	0.395	U	1.12	1.12		0.887	pCi/g	12/03/20 09:54	12/24/20 17:04	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-011**

**Lab Sample ID: 160-40590-13**

Date Collected: 11/23/20 11:34

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.00421	U	0.0429	0.0429		0.146	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Radium-226	0.219		0.132	0.134	0.200	0.0770	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Radium-228	0.172		0.253	0.253		0.137	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thallium-208	0.132		0.0562	0.0578		0.0222	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thorium 228	0.288		0.0823	0.0904		0.0434	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thorium-232	0.172		0.253	0.253		0.137	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Thorium-234	-0.636	U	0.541	0.545		0.672	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Uranium-235	0.129	U	0.249	0.250		0.223	pCi/g	12/03/20 09:54	12/24/20 17:04	1
Uranium-238	-0.636	U	0.541	0.545		0.672	pCi/g	12/03/20 09:54	12/24/20 17:04	1

**Client Sample ID: HPPG-SFU-TU108A-012**

**Lab Sample ID: 160-40590-14**

Date Collected: 11/23/20 11:37

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.384		0.138	0.143		0.0289	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Actinium-227	0.120	U	0.440	0.440		0.267	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Bismuth-212	0.896		0.465	0.474		0.159	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Bismuth-214	0.265		0.110	0.114		0.0542	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Cesium-137	0.0245	U	0.0494	0.0495	0.0700	0.0379	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Lead-210	1.07		1.25	1.26		0.839	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Lead-212	0.307		0.0816	0.0876		0.0436	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Lead-214	0.407		0.101	0.109		0.0456	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Potassium-40	7.78		1.22	1.45		0.112	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Protactinium-231	0.0690	U	0.949	0.949		2.01	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Protactinium-234	0.101	U	0.185	0.185		0.213	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Radium-226	0.265		0.110	0.114	0.200	0.0542	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Radium-228	0.384		0.138	0.143		0.0289	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thallium-208	0.129		0.0661	0.0674		0.0298	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thorium 228	0.307		0.0816	0.0876		0.0436	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thorium-232	0.384		0.138	0.143		0.0289	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Thorium-234	-0.830	U	0.583	0.591		0.797	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Uranium-235	-0.0205	U	0.0374	0.0374		0.393	pCi/g	12/03/20 09:54	12/24/20 19:09	1
Uranium-238	-0.830	U	0.583	0.591		0.797	pCi/g	12/03/20 09:54	12/24/20 19:09	1

**Client Sample ID: HPPG-SFU-TU108A-013**

**Lab Sample ID: 160-40590-15**

Date Collected: 11/23/20 11:42

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.198		0.111	0.113		0.104	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Actinium-227	0.335		0.370	0.372		0.204	pCi/g	12/03/20 09:54	12/24/20 19:06	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-013**

**Lab Sample ID: 160-40590-15**

Date Collected: 11/23/20 11:42

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.325	U	0.623	0.624		0.488	pCi/g	12/03/20 09:54	12/24/20 19:06	1
<b>Bismuth-214</b>	<b>0.279</b>		0.0969	0.101		0.0443	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Cesium-137	-0.0342	U	0.0535	0.0536	0.0700	0.0415	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Lead-210	0.466	U	1.04	1.04		0.832	pCi/g	12/03/20 09:54	12/24/20 19:06	1
<b>Lead-212</b>	<b>0.341</b>		0.0674	0.0806		0.0313	pCi/g	12/03/20 09:54	12/24/20 19:06	1
<b>Lead-214</b>	<b>0.262</b>		0.0752	0.0800		0.0414	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Potassium-40	8.32		1.08	1.38		0.0818	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Protactinium-231	0.000	U	0.407	0.407		1.62	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Protactinium-234	0.0747	U	0.203	0.203		0.163	pCi/g	12/03/20 09:54	12/24/20 19:06	1
<b>Radium-226</b>	<b>0.279</b>		0.0969	0.101	0.200	0.0443	pCi/g	12/03/20 09:54	12/24/20 19:06	1
<b>Radium-228</b>	<b>0.198</b>		0.111	0.113		0.104	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Thallium-208	0.128		0.0396	0.0418		0.0124	pCi/g	12/03/20 09:54	12/24/20 19:06	1
<b>Thorium 228</b>	<b>0.341</b>		0.0674	0.0806		0.0313	pCi/g	12/03/20 09:54	12/24/20 19:06	1
<b>Thorium-232</b>	<b>0.198</b>		0.111	0.113		0.104	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Thorium-234	0.000	U	0.230	0.230		0.712	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Uranium-235	0.000	U	0.118	0.118		0.292	pCi/g	12/03/20 09:54	12/24/20 19:06	1
Uranium-238	0.000	U	0.230	0.230		0.712	pCi/g	12/03/20 09:54	12/24/20 19:06	1

**Client Sample ID: HPPG-SFU-TU108A-014**

**Lab Sample ID: 160-40590-16**

Date Collected: 11/23/20 11:43

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.343		0.121	0.126		0.0234	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Actinium-227	0.171	U	0.376	0.376		0.225	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Bismuth-212	0.213	U	0.567	0.567		0.446	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Bismuth-214</b>	<b>0.314</b>		0.102	0.107		0.0339	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Cesium-137	0.00808	U	0.0427	0.0427	0.0700	0.0344	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Lead-210</b>	<b>0.983</b>		0.986	0.993		0.663	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Lead-212</b>	<b>0.234</b>		0.0678	0.0743		0.0382	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Lead-214</b>	<b>0.285</b>		0.0925	0.0971		0.0406	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Potassium-40	7.06		1.10	1.32		0.254	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Protactinium-231	0.519	U	1.42	1.42		1.55	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Protactinium-234	-0.0690	U	0.169	0.169		0.136	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Radium-226</b>	<b>0.314</b>		0.102	0.107	0.200	0.0339	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Radium-228</b>	<b>0.343</b>		0.121	0.126		0.0234	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Thallium-208	0.0833		0.0386	0.0396		0.0166	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Thorium 228</b>	<b>0.234</b>		0.0678	0.0743		0.0382	pCi/g	12/03/20 09:54	12/24/20 19:03	1
<b>Thorium-232</b>	<b>0.343</b>		0.121	0.126		0.0234	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Thorium-234	0.247	U	0.375	0.376		0.300	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Uranium-235	0.0963	U	0.209	0.209		0.215	pCi/g	12/03/20 09:54	12/24/20 19:03	1
Uranium-238	0.247	U	0.375	0.376		0.300	pCi/g	12/03/20 09:54	12/24/20 19:03	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-015**

**Lab Sample ID: 160-40590-17**

Matrix: Solid

Date Collected: 11/23/20 11:34  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.456		0.235	0.241		0.0849	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Actinium-227	0.107	U	0.357	0.357		0.396	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Bismuth-212	0.000	U	0.300	0.300		0.864	pCi/g	12/03/20 09:54	12/24/20 19:41	1
<b>Bismuth-214</b>	<b>0.271</b>		0.129	0.133		0.0622	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Cesium-137	0.0233	U	0.0884	0.0884	0.0700	0.0709	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Lead-210	0.428	U		1.85		1.22	pCi/g	12/03/20 09:54	12/24/20 19:41	1
<b>Lead-212</b>	<b>0.297</b>		0.101	0.107		0.0609	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Lead-214	0.400		0.146	0.153		0.0833	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Potassium-40	8.84		1.56	1.86		0.335	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Protactinium-231	-0.700	U	3.20	3.20		2.61	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Protactinium-234	-0.138	U	0.420	0.420		0.342	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Radium-226	0.271		0.129	0.133	0.200	0.0622	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Radium-228	0.456		0.235	0.241		0.0849	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thallium-208	0.144		0.0717	0.0736		0.0311	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thorium 228	0.297		0.101	0.107		0.0609	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thorium-232	0.456		0.235	0.241		0.0849	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Thorium-234	0.821		0.647	0.655		0.408	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Uranium-235	-0.261	U	0.112	0.116		0.592	pCi/g	12/03/20 09:54	12/24/20 19:41	1
Uranium-238	0.821		0.647	0.655		0.408	pCi/g	12/03/20 09:54	12/24/20 19:41	1

**Client Sample ID: HPPG-SFU-TU108A-016**

**Lab Sample ID: 160-40590-18**

Matrix: Solid

Date Collected: 11/23/20 11:40  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.165		0.181	0.181		0.145	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Actinium-227	0.0423	U	0.432	0.432		0.267	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Bismuth-212	-0.405	U	0.713	0.715		0.575	pCi/g	12/03/20 11:24	12/24/20 08:20	1
<b>Bismuth-214</b>	<b>0.244</b>		0.100	0.103		0.0575	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Cesium-137	0.0107	U	0.0635	0.0635	0.0700	0.0515	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Lead-210	0.755		0.954	0.958		0.647	pCi/g	12/03/20 11:24	12/24/20 08:20	1
<b>Lead-212</b>	<b>0.315</b>		0.0844	0.0937		0.0393	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Lead-214	0.322		0.115	0.119		0.0733	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Potassium-40	6.79		1.10	1.30		0.262	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Protactinium-231	0.528	U	1.69	1.69		1.37	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Protactinium-234	-0.0155	U	0.0358	0.0358		0.140	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Radium-226	0.244		0.100	0.103	0.200	0.0575	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Radium-228	0.165		0.181	0.181		0.145	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Thallium-208	0.128		0.0397	0.0419		0.0128	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Thorium 228	0.315		0.0844	0.0937		0.0393	pCi/g	12/03/20 11:24	12/24/20 08:20	1
<b>Thorium-232</b>	<b>0.165</b>		0.181	0.181		0.145	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Thorium-234	-0.332	U	0.489	0.490		0.658	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Uranium-235	0.000	U	0.113	0.113		0.213	pCi/g	12/03/20 11:24	12/24/20 08:20	1
Uranium-238	-0.332	U	0.489	0.490		0.658	pCi/g	12/03/20 11:24	12/24/20 08:20	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-017**

**Lab Sample ID: 160-40590-19**

Matrix: Solid

Date Collected: 11/23/20 11:45  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.320		0.122	0.127		0.0618	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Actinium-227	-0.250	U	0.492	0.493		0.362	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Bismuth-212	-0.371	U	0.416	0.418		0.571	pCi/g	12/03/20 11:24	12/24/20 08:54	1
<b>Bismuth-214</b>	<b>0.322</b>		0.0979	0.103		0.0468	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Cesium-137	-0.0410	U	0.0714	0.0715	0.0700	0.0560	pCi/g	12/03/20 11:24	12/24/20 08:54	1
<b>Lead-210</b>	<b>1.07</b>		1.21	1.21		0.775	pCi/g	12/03/20 11:24	12/24/20 08:54	1
<b>Lead-212</b>	<b>0.295</b>		0.0754	0.0845		0.0399	pCi/g	12/03/20 11:24	12/24/20 08:54	1
<b>Lead-214</b>	<b>0.338</b>		0.0974	0.104		0.0440	pCi/g	12/03/20 11:24	12/24/20 08:54	1
<b>Potassium-40</b>	<b>6.32</b>		1.31	1.46		0.441	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Protactinium-231	0.000	U	0.574	0.574		1.89	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Protactinium-234	0.0969	U	0.163	0.164		0.142	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Radium-226	0.322		0.0979	0.103	0.200	0.0468	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Radium-228	0.320		0.122	0.127		0.0618	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thallium-208	0.132		0.0453	0.0474		0.0173	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thorium 228	0.295		0.0754	0.0845		0.0399	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thorium-232	0.320		0.122	0.127		0.0618	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Thorium-234	0.336		0.465	0.466		0.336	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Uranium-235	0.105	U	0.268	0.268		0.215	pCi/g	12/03/20 11:24	12/24/20 08:54	1
Uranium-238	0.336		0.465	0.466		0.336	pCi/g	12/03/20 11:24	12/24/20 08:54	1

**Client Sample ID: HPPG-SFU-TU108A-018**

**Lab Sample ID: 160-40590-20**

Matrix: Solid

Date Collected: 11/23/20 11:47  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.198		0.170	0.171		0.0982	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Actinium-227	-0.179	U	0.462	0.462		0.342	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Bismuth-212	-0.204	U	0.487	0.488		0.523	pCi/g	12/03/20 11:24	12/24/20 09:34	1
<b>Bismuth-214</b>	<b>0.286</b>		0.127	0.130		0.0523	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Cesium-137	-0.0222	U	0.0527	0.0528	0.0700	0.0414	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Lead-210	0.295	U	1.07	1.07		0.764	pCi/g	12/03/20 11:24	12/24/20 09:34	1
<b>Lead-212</b>	<b>0.234</b>		0.0707	0.0770		0.0406	pCi/g	12/03/20 11:24	12/24/20 09:34	1
<b>Lead-214</b>	<b>0.197</b>		0.104	0.106		0.0516	pCi/g	12/03/20 11:24	12/24/20 09:34	1
<b>Potassium-40</b>	<b>7.04</b>		1.23	1.43		0.356	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Protactinium-231	0.000	U	0.191	0.191		1.87	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Protactinium-234	0.0448	U	0.0967	0.0968		0.142	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Radium-226	0.286		0.127	0.130	0.200	0.0523	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Radium-228	0.198		0.170	0.171		0.0982	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Thallium-208	0.0988		0.0389	0.0402		0.0160	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Thorium 228	0.234		0.0707	0.0770		0.0406	pCi/g	12/03/20 11:24	12/24/20 09:34	1
<b>Thorium-232</b>	<b>0.198</b>		0.170	0.171		0.0982	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Thorium-234	-0.339	U	0.772	0.773		0.634	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Uranium-235	0.0660	U	0.171	0.171		0.265	pCi/g	12/03/20 11:24	12/24/20 09:34	1
Uranium-238	-0.339	U	0.772	0.773		0.634	pCi/g	12/03/20 11:24	12/24/20 09:34	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-019**

**Lab Sample ID: 160-40590-21**

Matrix: Solid

Date Collected: 11/23/20 11:52  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.416		0.171	0.176		0.0617	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Actinium-227	0.0746	U	0.209	0.209		0.303	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Bismuth-212	0.254	U	0.761	0.761		0.607	pCi/g	12/03/20 11:24	12/24/20 10:21	1
<b>Bismuth-214</b>	<b>0.324</b>		0.0917	0.0977		0.0205	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Cesium-137	-0.00498	U	0.0648	0.0648	0.0700	0.0530	pCi/g	12/03/20 11:24	12/24/20 10:21	1
<b>Lead-210</b>	<b>1.13</b>		1.17	1.18		0.760	pCi/g	12/03/20 11:24	12/24/20 10:21	1
<b>Lead-212</b>	<b>0.302</b>		0.0766	0.0860		0.0407	pCi/g	12/03/20 11:24	12/24/20 10:21	1
<b>Lead-214</b>	<b>0.332</b>		0.103	0.108		0.0443	pCi/g	12/03/20 11:24	12/24/20 10:21	1
<b>Potassium-40</b>	<b>8.45</b>		1.25	1.52		0.275	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Protactinium-231	0.000	U	0.762	0.762		1.90	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Protactinium-234	-0.0854	U	0.209	0.209		0.169	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Radium-226	0.324		0.0917	0.0977	0.200	0.0205	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Radium-228	0.416		0.171	0.176		0.0617	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Thallium-208	0.166		0.0508	0.0536		0.0178	pCi/g	12/03/20 11:24	12/24/20 10:21	1
<b>Thorium 228</b>	<b>0.302</b>		0.0766	0.0860		0.0407	pCi/g	12/03/20 11:24	12/24/20 10:21	1
<b>Thorium-232</b>	<b>0.416</b>		0.171	0.176		0.0617	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Thorium-234	-0.483	U	0.842	0.844		0.678	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Uranium-235	0.000	U	0.173	0.173		0.253	pCi/g	12/03/20 11:24	12/24/20 10:21	1
Uranium-238	-0.483	U	0.842	0.844		0.678	pCi/g	12/03/20 11:24	12/24/20 10:21	1

**Client Sample ID: HPPG-SFU-TU108A-020**

**Lab Sample ID: 160-40590-22**

Matrix: Solid

Date Collected: 11/23/20 11:49  
Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.425		0.139	0.146		0.0253	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Actinium-227	0.153	U	0.329	0.329		0.313	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Bismuth-212	0.178	U	0.477	0.477		0.370	pCi/g	12/03/20 11:24	12/24/20 10:58	1
<b>Bismuth-214</b>	<b>0.250</b>		0.0854	0.0892		0.0281	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Cesium-137	0.00194	U	0.0554	0.0554	0.0700	0.0455	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Lead-210	0.138	U	0.973	0.973		0.712	pCi/g	12/03/20 11:24	12/24/20 10:58	1
<b>Lead-212</b>	<b>0.297</b>		0.0763	0.0854		0.0409	pCi/g	12/03/20 11:24	12/24/20 10:58	1
<b>Lead-214</b>	<b>0.158</b>		0.111	0.113		0.0810	pCi/g	12/03/20 11:24	12/24/20 10:58	1
<b>Potassium-40</b>	<b>6.31</b>		1.09	1.27		0.275	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Protactinium-231	0.486	U	1.59	1.59		1.74	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Protactinium-234	0.0181	U	0.0319	0.0319		0.159	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Radium-226	0.250		0.0854	0.0892	0.200	0.0281	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Radium-228	0.425		0.139	0.146		0.0253	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Thallium-208	0.103		0.0456	0.0468		0.0203	pCi/g	12/03/20 11:24	12/24/20 10:58	1
<b>Thorium 228</b>	<b>0.297</b>		0.0763	0.0854		0.0409	pCi/g	12/03/20 11:24	12/24/20 10:58	1
<b>Thorium-232</b>	<b>0.425</b>		0.139	0.146		0.0253	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Thorium-234	0.172	U	0.354	0.354		0.276	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Uranium-235	0.118	U	0.328	0.328		0.232	pCi/g	12/03/20 11:24	12/24/20 10:58	1
Uranium-238	0.172	U	0.354	0.354		0.276	pCi/g	12/03/20 11:24	12/24/20 10:58	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-021**

**Lab Sample ID: 160-40590-23**

Date Collected: 11/23/20 11:53

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: 905 - Strontium-90 (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	0.0302	U J	0.142	0.142	0.331	0.114	pCi/g	12/03/20 11:35	12/14/20 17:12	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	99.9		40 - 110					12/03/20 11:35	12/14/20 17:12	1
Y Carrier	92.0		40 - 110					12/03/20 11:35	12/14/20 17:12	1

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.148		0.187	0.188		0.111	pCi/g	12/03/20 11:24	12/24/20 11:09	1
<b>Actinium-227</b>	<b>0.557</b>		0.407	0.411		0.217	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Bismuth-212	0.216	U	0.498	0.499		0.381	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Bismuth-214	0.0543	U	0.139	0.139		0.171	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Cesium-137	-0.0217	U	0.0837	0.0838	0.0700	0.0676	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Lead-210	-0.713	U	1.67	1.68		1.41	pCi/g	12/03/20 11:24	12/24/20 11:09	1
<b>Lead-212</b>	<b>0.325</b>		0.0768	0.0840		0.0354	pCi/g	12/03/20 11:24	12/24/20 11:09	1
<b>Lead-214</b>	<b>0.349</b>		0.0975	0.104		0.0498	pCi/g	12/03/20 11:24	12/24/20 11:09	1
<b>Potassium-40</b>	<b>7.36</b>		1.54	1.71		0.473	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Protactinium-231	0.582	U	1.76	1.76		1.93	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Protactinium-234	-0.0931	U	0.282	0.282		0.230	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Radium-226	0.0543	U	0.139	0.139	0.200	0.171	pCi/g	12/03/20 11:24	12/24/20 11:09	1
<b>Radium-228</b>	<b>0.148</b>		0.187	0.188		0.111	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Thallium-208	0.119		0.0382	0.0401		0.00713	pCi/g	12/03/20 11:24	12/24/20 11:09	1
<b>Thorium 228</b>	<b>0.325</b>		0.0768	0.0840		0.0354	pCi/g	12/03/20 11:24	12/24/20 11:09	1
<b>Thorium-232</b>	<b>0.148</b>		0.187	0.188		0.111	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Thorium-234	-0.177	U	0.875	0.876		0.725	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Uranium-235	0.0225	U	0.210	0.210		0.371	pCi/g	12/03/20 11:24	12/24/20 11:09	1
Uranium-238	-0.177	U	0.875	0.876		0.725	pCi/g	12/03/20 11:24	12/24/20 11:09	1

**Client Sample ID: HPPG-SFU-TU108A-022**

**Lab Sample ID: 160-40590-24**

Date Collected: 11/23/20 11:45

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.203		0.216	0.217		0.109	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Actinium-227	0.0760	U	0.518	0.518		0.375	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Bismuth-212	0.564	U	1.12	1.13		0.885	pCi/g	12/03/20 11:24	12/24/20 10:42	1
<b>Bismuth-214</b>	<b>0.318</b>		0.125	0.130		0.0583	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Cesium-137	-0.0493	U	0.0887	0.0889	0.0700	0.0480	pCi/g	12/03/20 11:24	12/24/20 10:42	1
<b>Lead-210</b>	<b>1.29</b>		1.57	1.58		0.997	pCi/g	12/03/20 11:24	12/24/20 10:42	1
<b>Lead-212</b>	<b>0.304</b>		0.0859	0.0930		0.0450	pCi/g	12/03/20 11:24	12/24/20 10:42	1
<b>Lead-214</b>	<b>0.302</b>		0.112	0.117		0.0557	pCi/g	12/03/20 11:24	12/24/20 10:42	1
<b>Potassium-40</b>	<b>8.41</b>		1.45	1.74		0.306	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Protactinium-231	0.662	U	2.17	2.17		2.33	pCi/g	12/03/20 11:24	12/24/20 10:42	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-022**

**Lab Sample ID: 160-40590-24**

Date Collected: 11/23/20 11:45  
Date Received: 11/27/20 09:12

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0976	U	0.225	0.225		0.238	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Radium-226	0.318		0.125	0.130	0.200	0.0583	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Radium-228	0.203		0.216	0.217		0.109	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thallium-208	0.0987		0.0440	0.0454		0.0171	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thorium 228	0.304		0.0859	0.0930		0.0450	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thorium-232	0.203		0.216	0.217		0.109	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Thorium-234	0.300	U	0.574	0.575		0.404	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Uranium-235	-0.204	U	0.274	0.275		0.437	pCi/g	12/03/20 11:24	12/24/20 10:42	1
Uranium-238	0.300	U	0.574	0.575		0.404	pCi/g	12/03/20 11:24	12/24/20 10:42	1

**Client Sample ID: HPPG-SFU-TU108A-023**

**Lab Sample ID: 160-40590-25**

Date Collected: 11/23/20 12:08  
Date Received: 11/27/20 09:12

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.300		0.136	0.140		0.0803	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Actinium-227	0.169	U	0.408	0.409		0.246	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Bismuth-212	-0.0722	U	0.628	0.628		0.541	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Bismuth-214	0.424		0.0993	0.109		0.0217	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Cesium-137	0.0196	U	0.0428	0.0428	0.0700	0.0331	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Lead-210	1.27		1.06	1.07		0.673	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Lead-212	0.295		0.0736	0.0829		0.0389	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Lead-214	0.291		0.0911	0.0960		0.0407	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Potassium-40	7.48		1.15	1.38		0.263	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Protactinium-231	0.000	U	0.718	0.718		1.80	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Protactinium-234	0.0929	U	0.0515	0.0524		0.169	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Radium-226	0.424		0.0993	0.109	0.200	0.0217	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Radium-228	0.300		0.136	0.140		0.0803	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thallium-208	0.105		0.0466	0.0478		0.0223	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thorium 228	0.295		0.0736	0.0829		0.0389	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thorium-232	0.300		0.136	0.140		0.0803	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Thorium-234	0.188	U	0.389	0.389		0.306	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Uranium-235	-0.00798	U	0.0125	0.0125		0.235	pCi/g	12/03/20 11:24	12/24/20 12:21	1
Uranium-238	0.188	U	0.389	0.389		0.306	pCi/g	12/03/20 11:24	12/24/20 12:21	1

**Client Sample ID: HPPG-SFU-TU108A-024**

**Lab Sample ID: 160-40590-26**

Date Collected: 11/23/20 11:57  
Date Received: 11/27/20 09:12

Matrix: Solid

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.403		0.208	0.212		0.127	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Actinium-227	0.160	U	0.299	0.299		0.302	pCi/g	12/03/20 11:24	12/24/20 10:22	1

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# Client Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

**Client Sample ID: HPPG-SFU-TU108A-024**

**Lab Sample ID: 160-40590-26**

Date Collected: 11/23/20 11:57

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.410	U	0.720	0.721		0.713	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Bismuth-214</b>	<b>0.367</b>		0.151	0.155		0.0793	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Cesium-137	-0.0334	U	0.0502	0.0503	0.0700	0.0509	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Lead-210</b>	<b>1.28</b>		1.45	1.46		0.851	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Lead-212</b>	<b>0.267</b>		0.0811	0.0882		0.0400	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Lead-214</b>	<b>0.239</b>		0.110	0.113		0.0738	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Potassium-40</b>	<b>8.00</b>		1.56	1.76		0.283	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Protactinium-231	0.359	U	1.50	1.50		1.85	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Protactinium-234	-0.0641	U	0.211	0.211		0.171	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Radium-226</b>	<b>0.367</b>		0.151	0.155	0.200	0.0793	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Radium-228</b>	<b>0.403</b>		0.208	0.212		0.127	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Thallium-208</b>	<b>0.174</b>		0.0655	0.0679		0.0251	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Thorium-228</b>	<b>0.267</b>		0.0811	0.0882		0.0400	pCi/g	12/03/20 11:24	12/24/20 10:22	1
<b>Thorium-232</b>	<b>0.403</b>		0.208	0.212		0.127	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Thorium-234	0.283	U	0.480	0.481		0.381	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Uranium-235	0.0176	U	0.0285	0.0285		0.290	pCi/g	12/03/20 11:24	12/24/20 10:22	1
Uranium-238	0.283	U	0.480	0.481		0.381	pCi/g	12/03/20 11:24	12/24/20 10:22	1

**Client Sample ID: HPPG-SFU-TU108A-025**

**Lab Sample ID: 160-40590-27**

Date Collected: 11/23/20 12:02

Matrix: Solid

Date Received: 11/27/20 09:12

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			(2σ+/-)	(2σ+/-)						
<b>Actinium-228</b>	<b>0.469</b>		0.131	0.140		0.0214	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Actinium-227	0.0266	U	0.448	0.448		0.265	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Bismuth-212	0.250	U	0.691	0.691		0.551	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Bismuth-214</b>	<b>0.228</b>		0.0823	0.0856		0.0378	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Cesium-137	0.0180	U	0.0451	0.0452	0.0700	0.0355	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Lead-210	0.242	U	1.06	1.06		0.859	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Lead-212</b>	<b>0.286</b>		0.0649	0.0747		0.0322	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Lead-214</b>	<b>0.317</b>		0.0836	0.0899		0.0531	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Potassium-40</b>	<b>7.12</b>		1.06	1.29		0.240	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Protactinium-231	0.184	U	1.01	1.01		1.56	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Protactinium-234	-0.0238	U	0.0496	0.0497		0.175	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Radium-226</b>	<b>0.228</b>		0.0823	0.0856	0.200	0.0378	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Radium-228</b>	<b>0.469</b>		0.131	0.140		0.0214	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Thallium-208</b>	<b>0.147</b>		0.0386	0.0415		0.0102	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Thorium-228</b>	<b>0.286</b>		0.0649	0.0747		0.0322	pCi/g	12/03/20 11:24	12/24/20 11:08	1
<b>Thorium-232</b>	<b>0.469</b>		0.131	0.140		0.0214	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Thorium-234	-0.0412	U	0.110	0.110		0.707	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Uranium-235	0.0105	U	0.145	0.145		0.315	pCi/g	12/03/20 11:24	12/24/20 11:08	1
Uranium-238	-0.0412	U	0.110	0.110		0.707	pCi/g	12/03/20 11:24	12/24/20 11:08	1

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# QC Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40590-1  
 SDG: GJ46599766

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID:** MB 160-490804/22-A

**Matrix:** Solid

**Analysis Batch:** 491746

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490804

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Strontium-90	0.1449		0.155	0.156	0.331	0.117	pCi/g	12/03/20 11:35	12/14/20 17:12	1
<b>Carrier</b>										
<i>Sr Carrier</i> 102      40 - 110      12/03/20 11:35      12/14/20 17:12      1										
<i>Y Carrier</i> 92.7      40 - 110      12/03/20 11:35      12/14/20 17:12      1										

**Lab Sample ID:** LCS 160-490804/1-A

**Matrix:** Solid

**Analysis Batch:** 491659

**Client Sample ID:** Lab Control Sample

**Prep Type:** Total/NA

**Prep Batch:** 490804

Analyte	MB	MB	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.Limits
	Result	Qualifier								
Strontium-90			7.76	5.722	J	0.669	0.331	0.147	pCi/g	74      75 - 125
<b>Carrier</b>										
<i>Sr Carrier</i> 80.9      40 - 110      12/02/20 14:03      12/23/20 08:18      1										
<i>Y Carrier</i> 93.8      40 - 110										

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID:** MB 160-490768/1-A

**Matrix:** Solid

**Analysis Batch:** 492829

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490768

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac	
	Result	Qualifier									
Actinium 228	-0.03808	U	0.0956	0.0957		0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Actinium-227	0.08637	U		0.222	0.222	0.306	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Bismuth-212	0.3625	U		0.680	0.681	0.513	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Bismuth-214	-0.01490	U		0.0268	0.0268	0.158	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Cesium-137	-0.01957	U		0.0651	0.0651	0.0700	0.0357	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Lead-210	0.2513	U		1.22	1.22	0.879	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Lead-212	-0.007941	U		0.0847	0.0847	0.0698	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Lead-214	-0.01332	U		0.0954	0.0954	0.0787	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Potassium-40	0.4500			0.537	0.539	0.339	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Protactinium-231	0.7858	U		0.759	0.763	2.03	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Protactinium-234	-0.09659	U		0.216	0.216	0.242	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Radium-226	-0.01490	U		0.0268	0.0268	0.200	0.158	pCi/g	12/02/20 14:03	12/23/20 08:18	1
Radium-228	-0.03808	U		0.0956	0.0957	0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Thallium-208	0.03546			0.0510	0.0511	0.0192	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Thorium 228	-0.007941	U		0.0847	0.0847	0.0698	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Thorium-232	-0.03808	U		0.0956	0.0957	0.137	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Thorium-234	0.1218	U		0.618	0.618	0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Uranium-235	0.1931	U		0.260	0.261	0.218	pCi/g	12/02/20 14:03	12/23/20 08:18	1	
Uranium-238	0.1218	U		0.618	0.618	0.414	pCi/g	12/02/20 14:03	12/23/20 08:18	1	

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID:** LCS 160-490768/2-A  
**Matrix:** Solid  
**Analysis Batch:** 492822

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA  
**Prep Batch:** 490768

Analyte	Spike Added	LCS		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual						
Americium-241	96.4	97.41		11.5		0.632	pCi/g	101	87 - 116
Cesium-137	26.7	29.43		3.09	0.0700	0.111	pCi/g	110	87 - 120
Cobalt-60	9.43	9.871		1.04		0.0464	pCi/g	105	87 - 115

**Lab Sample ID:** 160-40590-4 DU  
**Matrix:** Solid  
**Analysis Batch:** 492831

**Client Sample ID:** HPPG-SFU-TU108A-002  
**Prep Type:** Total/NA  
**Prep Batch:** 490768

Analyte	Sample		DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Actinium 228	0.310		0.4510		0.318		0.140	pCi/g	0.26	1
Actinium-227	0.249	U	-0.3844	U	0.737		0.487	pCi/g	0.50	1
Bismuth-212	-0.317	U	-0.2971	U	1.03		0.824	pCi/g	0.01	1
Bismuth-214	0.365		0.2373		0.139		0.210	pCi/g	0.43	1
Cesium-137	0.0116	U	0.02156	U	0.0837	0.0700	0.0671	pCi/g	0.07	1
Lead-210	0.858		2.034		1.80		1.08	pCi/g	0.42	1
Lead-212	0.388		0.3717		0.121		0.0690	pCi/g	0.07	1
Lead-214	0.202		0.4619		0.173		0.0715	pCi/g	0.84	1
Potassium-40	7.99		8.862		1.83		0.320	pCi/g	0.23	1
Protactinium-231	-0.851	U	0.1210	U	0.0930		3.01	pCi/g	0.39	1
Protactinium-234	0.0830	U	0.09286	U	0.0570		0.300	pCi/g	0.06	1
Radium-226	0.365		0.2373		0.139	0.200	0.210	pCi/g	0.43	1
Radium-228	0.310		0.4510		0.318		0.140	pCi/g	0.26	1
Thallium-208	0.145		0.1901		0.0691		0.0242	pCi/g	0.31	1
Thorium 228	0.388		0.3717		0.121		0.0690	pCi/g	0.07	1
Thorium-232	0.310		0.4510		0.318		0.140	pCi/g	0.26	1
Thorium-234	0.364	U	0.5512		0.693		0.479	pCi/g	0.16	1
Uranium-235	0.0706	U	0.1004	U	0.201		0.542	pCi/g	0.08	1
Uranium-238	0.364	U	0.5512		0.693		0.479	pCi/g	0.16	1

**Lab Sample ID:** MB 160-490771/1-A  
**Matrix:** Solid  
**Analysis Batch:** 492822

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 490771

Analyte	MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)		LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier		(2σ+/-)	(2σ+/-)						
Actinium 228	0.1200		0.187	0.187			0.0913	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Actinium-227	-0.2919	U	0.601	0.601			0.356	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Bismuth-212	0.4349	U	0.878	0.879			0.675	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Bismuth-214	0.09028	U	0.0544	0.0552			0.235	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Cesium-137	-0.003155	U	0.0599	0.0599	0.0700		0.0489	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Lead-210	0.6968	U	1.25	1.25			0.908	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Lead-212	0.0000164	U	0.101	0.101			0.0829	pCi/g	12/02/20 15:05	12/23/20 16:29	1
			7								
Lead-214	0.02953	U	0.0855	0.0855			0.0648	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Potassium-40	0.4077		0.333	0.335			0.158	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Protactinium-231	0.0000	U	0.311	0.311			2.16	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Protactinium-234	-0.09742	U	0.297	0.297			0.240	pCi/g	12/02/20 15:05	12/23/20 16:29	1

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID:** MB 160-490771/1-A

**Matrix:** Solid

**Analysis Batch:** 492822

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490771

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac	
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)						
Radium-226	0.09028	U		0.0544		0.0552		0.200	0.235	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Radium-228	0.1200				0.187	0.187			0.0913	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Thallium-208	0.04196			0.0639		0.0640			0.0298	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Thorium 228	0.0000164	U			0.101	0.101			0.0829	pCi/g	12/02/20 15:05	12/23/20 16:29	1
	7												
Thorium-232	0.1200				0.187	0.187			0.0913	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Thorium-234	0.2125	U			0.548	0.549			0.379	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Uranium-235	0.08877	U			0.181	0.182			0.439	pCi/g	12/02/20 15:05	12/23/20 16:29	1
Uranium-238	0.2125	U			0.548	0.549			0.379	pCi/g	12/02/20 15:05	12/23/20 16:29	1

**Lab Sample ID:** LCS 160-490771/2-A

**Matrix:** Solid

**Analysis Batch:** 492824

**Client Sample ID:** Lab Control Sample

**Prep Type:** Total/NA

**Prep Batch:** 490771

Analyte	Spike Added	LCS		Total		LOQ	DLC	Unit	%Rec	Limits	%Rec.
		Result	Qual	Uncert.	(2σ+/-)						
Americium-241	96.4	92.86		9.75			0.524	pCi/g	96	87 - 116	
Cesium-137	26.7	26.07		2.77		0.0700	0.0790	pCi/g	98	87 - 120	
Cobalt-60	9.43	8.837		0.929			0.0279	pCi/g	94	87 - 115	

**Lab Sample ID:** MB 160-490785/1-A

**Matrix:** Solid

**Analysis Batch:** 492980

**Client Sample ID:** Method Blank

**Prep Type:** Total/NA

**Prep Batch:** 490785

Analyte	Result	MB		Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
		MB	MB	Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Actinium 228	0.06936	U		0.114		0.115		0.115	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Actinium-227	-0.3769	U		0.698		0.699		0.395	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Bismuth-212	-0.5112	U		1.05		1.05		0.808	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Bismuth-214	-0.07410	U		0.156		0.156		0.180	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Cesium-137	-0.04068	U		0.0658		0.0660		0.0486	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Lead-210	-0.5627	U		1.44		1.44		1.21	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Lead-212	-0.04310	U		0.0838		0.0840		0.109	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Lead-214	-0.09477	U		0.179		0.179		0.111	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Potassium-40	-0.8061	U		0.606		0.612		0.741	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Protactinium-231	0.0000003	U		3.25		3.25		2.67	pCi/g	12/03/20 09:54	12/24/20 11:12	1
	159											
Protactinium-234	-0.005059	U		0.226		0.226		0.186	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Radium-226	-0.07410	U		0.156		0.156		0.180	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Radium-228	0.06936	U		0.114		0.115		0.115	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thallium-208	0.005106	U		0.0111		0.0111		0.0405	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thorium 228	-0.04310	U		0.0838		0.0840		0.109	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thorium-232	0.06936	U		0.114		0.115		0.115	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Thorium-234	-0.6086	U		0.727		0.730		0.908	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Uranium-235	0.09822	U		0.193		0.193		0.475	pCi/g	12/03/20 09:54	12/24/20 11:12	1
Uranium-238	-0.6086	U		0.727		0.730		0.908	pCi/g	12/03/20 09:54	12/24/20 11:12	1

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# QC Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40590-1  
 SDG: GJ46599766

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID:** LCS 160-490785/2-A  
**Matrix:** Solid  
**Analysis Batch:** 492976

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA  
**Prep Batch:** 490785

Analyte	Spike Added	LCS		Uncert. (2σ+/-)	Total		%Rec.		Limits
		Result	Qual		LOQ	DLC	Unit	%Rec	
Americium-241	96.4	93.81		9.84		0.496	pCi/g	97	87 - 116
Cesium-137	26.7	25.10		2.67	0.0700	0.0826	pCi/g	94	87 - 120
Cobalt-60	9.43	9.022		0.946		0.00975	pCi/g	96	87 - 115

**Lab Sample ID:** 160-40590-17 DU  
**Matrix:** Solid  
**Analysis Batch:** 493018

**Client Sample ID:** HPPG-SFU-TU108A-015  
**Prep Type:** Total/NA  
**Prep Batch:** 490785

Analyte	Sample	Sample	DU		Uncert. (2σ+/-)	Total				RER	Limit
	Result	Qual	Result	Qual		LOQ	DLC	Unit	RER		
Actinium 228	0.456		0.3761		0.134		0.0837	pCi/g		0.21	1
Actinium-227	0.107	U	0.2493	U	0.498		0.296	pCi/g		0.17	1
Bismuth-212	0.000	U	0.3702	U	0.713		0.540	pCi/g		0.37	1
Bismuth-214	0.271		0.4143		0.142		0.0519	pCi/g		0.52	1
Cesium-137	0.0233	U	0.03586	U	0.0750	0.0700	0.0582	pCi/g		0.08	1
Lead-210	0.428	U	-1.225	U	2.06		1.74	pCi/g		0.42	1
Lead-212	0.297		0.4150		0.0965		0.0350	pCi/g		0.58	1
Lead-214	0.400		0.4514		0.112		0.0505	pCi/g		0.19	1
Potassium-40	8.84		9.438		1.89		0.235	pCi/g		0.16	1
Protactinium-231	-0.700	U	-1.002	U	3.37		2.75	pCi/g		0.05	1
Protactinium-234	-0.138	U	-0.01142	U	0.0337		0.236	pCi/g		0.28	1
Radium-226	0.271		0.4143		0.142	0.200	0.0519	pCi/g		0.52	1
Radium-228	0.456		0.3761		0.134		0.0837	pCi/g		0.21	1
Thallium-208	0.144		0.1508		0.125		0.0462	pCi/g		0.03	1
Thorium 228	0.297		0.4150		0.0965		0.0350	pCi/g		0.58	1
Thorium-232	0.456		0.3761		0.134		0.0837	pCi/g		0.21	1
Thorium-234	0.821		0.1675	U	0.469		0.383	pCi/g		0.58	1
Uranium-235	-0.261	U	0.08968	U	0.499		0.408	pCi/g		0.57	1
Uranium-238	0.821		0.1675	U	0.469		0.383	pCi/g		0.58	1

**Lab Sample ID:** MB 160-490802/1-A  
**Matrix:** Solid  
**Analysis Batch:** 492976

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 490802

Analyte	MB	MB	Count	Total		Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)	LOQ	DLC	Unit	
Actinium 228	-0.03762	U	0.218	0.218		0.113	pCi/g	12/03/20 11:24
Actinium-227	-0.3031	U	0.525	0.526		0.335	pCi/g	12/03/20 11:24
Bismuth-212	-0.3011	U	0.398	0.399		0.562	pCi/g	12/03/20 11:24
Bismuth-214	-0.06394	U	0.114	0.114		0.134	pCi/g	12/03/20 11:24
Cesium-137	0.0000	U	0.00946	0.00946	0.0700	0.0181	pCi/g	12/03/20 11:24
Lead-210	0.2354	U	0.771	0.771		0.611	pCi/g	12/03/20 11:24
Lead-212	-0.004504	U	0.0798	0.0798		0.0671	pCi/g	12/03/20 11:24
Lead-214	-0.04921	U	0.0735	0.0737		0.0644	pCi/g	12/03/20 11:24
Potassium-40	0.09750	U	0.430	0.430		0.327	pCi/g	12/03/20 11:24
Protactinium-231	0.2248	U	0.795	0.795		1.45	pCi/g	12/03/20 11:24
Protactinium-234	0.01682	U	0.0825	0.0825		0.0661	pCi/g	12/03/20 11:24
Radium-226	-0.06394	U	0.114	0.114	0.200	0.134	pCi/g	12/03/20 11:24

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# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-490802/1-A

Matrix: Solid

Analysis Batch: 492976

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 490802

Analyte	Result	MB	MB	Count		Total		DLC	Unit	Prepared	Analyzed	Dil Fac
				Uncert.	(2σ+/-)	Uncert.	(2σ+/-)					
Radium-228	-0.03762	U		0.218		0.218		0.113	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thallium-208	0.007245	U		0.0113		0.0113		0.0301	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thorium 228	-0.004504	U		0.0798		0.0798		0.0671	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thorium-232	-0.03762	U		0.218		0.218		0.113	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Thorium-234	0.00000	U		0.143		0.143		0.539	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Uranium-235	0.05006	U		0.229		0.229		0.185	pCi/g	12/03/20 11:24	12/24/20 10:35	1
Uranium-238	0.00000	U		0.143		0.143		0.539	pCi/g	12/03/20 11:24	12/24/20 10:35	1

Lab Sample ID: LCS 160-490802/2-A

Matrix: Solid

Analysis Batch: 492974

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 490802

Analyte	Spike Added	LCS Result	LCS Qual	Total				%Rec	Limits
				Uncert. (2σ+/-)	LOQ	DLC	Unit		
Americium-241	96.4	91.19		9.58		0.524	pCi/g	95	87 - 116
Cesium-137	26.7	25.30		2.69	0.0700	0.0802	pCi/g	95	87 - 120
Cobalt-60	9.43	8.864		0.930		0.0237	pCi/g	94	87 - 115

Eurofins TestAmerica, St. Louis

# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

## Rad

### Leach Batch: 490566

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-1	HPPG-F-043	Total/NA	Solid	Dry and Grind	
160-40590-2	HPPG-F-044	Total/NA	Solid	Dry and Grind	
160-40590-3	HPPG-SFU-TU108A-001	Total/NA	Solid	Dry and Grind	
160-40590-4	HPPG-SFU-TU108A-002	Total/NA	Solid	Dry and Grind	
160-40590-5	HPPG-SFU-TU108A-003	Total/NA	Solid	Dry and Grind	
160-40590-6	HPPG-SFU-TU108A-004	Total/NA	Solid	Dry and Grind	
160-40590-7	HPPG-SFU-TU108A-005	Total/NA	Solid	Dry and Grind	
160-40590-8	HPPG-SFU-TU108A-006	Total/NA	Solid	Dry and Grind	
160-40590-4 DU	HPPG-SFU-TU108A-002	Total/NA	Solid	Dry and Grind	

### Leach Batch: 490573

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-9	HPPG-SFU-TU108A-007	Total/NA	Solid	Dry and Grind	
160-40590-10	HPPG-SFU-TU108A-008	Total/NA	Solid	Dry and Grind	
160-40590-11	HPPG-SFU-TU108A-009	Total/NA	Solid	Dry and Grind	
160-40590-12	HPPG-SFU-TU108A-010	Total/NA	Solid	Dry and Grind	
160-40590-13	HPPG-SFU-TU108A-011	Total/NA	Solid	Dry and Grind	
160-40590-14	HPPG-SFU-TU108A-012	Total/NA	Solid	Dry and Grind	
160-40590-15	HPPG-SFU-TU108A-013	Total/NA	Solid	Dry and Grind	
160-40590-16	HPPG-SFU-TU108A-014	Total/NA	Solid	Dry and Grind	
160-40590-17	HPPG-SFU-TU108A-015	Total/NA	Solid	Dry and Grind	
160-40590-18	HPPG-SFU-TU108A-016	Total/NA	Solid	Dry and Grind	
160-40590-19	HPPG-SFU-TU108A-017	Total/NA	Solid	Dry and Grind	
160-40590-20	HPPG-SFU-TU108A-018	Total/NA	Solid	Dry and Grind	
160-40590-21	HPPG-SFU-TU108A-019	Total/NA	Solid	Dry and Grind	
160-40590-22	HPPG-SFU-TU108A-020	Total/NA	Solid	Dry and Grind	
160-40590-23	HPPG-SFU-TU108A-021	Total/NA	Solid	Dry and Grind	
160-40590-24	HPPG-SFU-TU108A-022	Total/NA	Solid	Dry and Grind	
160-40590-25	HPPG-SFU-TU108A-023	Total/NA	Solid	Dry and Grind	
160-40590-26	HPPG-SFU-TU108A-024	Total/NA	Solid	Dry and Grind	
160-40590-27	HPPG-SFU-TU108A-025	Total/NA	Solid	Dry and Grind	
160-40590-17 DU	HPPG-SFU-TU108A-015	Total/NA	Solid	Dry and Grind	

### Prep Batch: 490768

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-1	HPPG-F-043	Total/NA	Solid	Fill_Geo-21	490566
160-40590-2	HPPG-F-044	Total/NA	Solid	Fill_Geo-21	490566
160-40590-3	HPPG-SFU-TU108A-001	Total/NA	Solid	Fill_Geo-21	490566
160-40590-4	HPPG-SFU-TU108A-002	Total/NA	Solid	Fill_Geo-21	490566
MB 160-490768/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490768/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40590-4 DU	HPPG-SFU-TU108A-002	Total/NA	Solid	Fill_Geo-21	490566

### Prep Batch: 490771

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-5	HPPG-SFU-TU108A-003	Total/NA	Solid	Fill_Geo-21	490566
160-40590-6	HPPG-SFU-TU108A-004	Total/NA	Solid	Fill_Geo-21	490566
160-40590-7	HPPG-SFU-TU108A-005	Total/NA	Solid	Fill_Geo-21	490566
MB 160-490771/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490771/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

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# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

Rad

Prep Batch: 490785

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-8	HPPG-SFU-TU108A-006	Total/NA	Solid	Fill_Geo-21	490566
160-40590-9	HPPG-SFU-TU108A-007	Total/NA	Solid	Fill_Geo-21	490573
160-40590-10	HPPG-SFU-TU108A-008	Total/NA	Solid	Fill_Geo-21	490573
160-40590-11	HPPG-SFU-TU108A-009	Total/NA	Solid	Fill_Geo-21	490573
160-40590-12	HPPG-SFU-TU108A-010	Total/NA	Solid	Fill_Geo-21	490573
160-40590-13	HPPG-SFU-TU108A-011	Total/NA	Solid	Fill_Geo-21	490573
160-40590-14	HPPG-SFU-TU108A-012	Total/NA	Solid	Fill_Geo-21	490573
160-40590-15	HPPG-SFU-TU108A-013	Total/NA	Solid	Fill_Geo-21	490573
160-40590-16	HPPG-SFU-TU108A-014	Total/NA	Solid	Fill_Geo-21	490573
160-40590-17	HPPG-SFU-TU108A-015	Total/NA	Solid	Fill_Geo-21	490573
MB 160-490785/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490785/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40590-17 DU	HPPG-SFU-TU108A-015	Total/NA	Solid	Fill_Geo-21	490573

Prep Batch: 490802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-18	HPPG-SFU-TU108A-016	Total/NA	Solid	Fill_Geo-21	490573
160-40590-19	HPPG-SFU-TU108A-017	Total/NA	Solid	Fill_Geo-21	490573
160-40590-20	HPPG-SFU-TU108A-018	Total/NA	Solid	Fill_Geo-21	490573
160-40590-21	HPPG-SFU-TU108A-019	Total/NA	Solid	Fill_Geo-21	490573
160-40590-22	HPPG-SFU-TU108A-020	Total/NA	Solid	Fill_Geo-21	490573
160-40590-23	HPPG-SFU-TU108A-021	Total/NA	Solid	Fill_Geo-21	490573
160-40590-24	HPPG-SFU-TU108A-022	Total/NA	Solid	Fill_Geo-21	490573
160-40590-25	HPPG-SFU-TU108A-023	Total/NA	Solid	Fill_Geo-21	490573
160-40590-26	HPPG-SFU-TU108A-024	Total/NA	Solid	Fill_Geo-21	490573
160-40590-27	HPPG-SFU-TU108A-025	Total/NA	Solid	Fill_Geo-21	490573
MB 160-490802/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490802/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 490804

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40590-3	HPPG-SFU-TU108A-001	Total/NA	Solid	DPS-7	490566
160-40590-13	HPPG-SFU-TU108A-011	Total/NA	Solid	DPS-7	490573
160-40590-23	HPPG-SFU-TU108A-021	Total/NA	Solid	DPS-7	490573
MB 160-490804/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-490804/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Eurofins TestAmerica, St. Louis

# Tracer/Carrier Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40590-1  
SDG: GJ46599766

## Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

### Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40590-3	HPPG-SFU-TU108A-001	104	90.5
160-40590-13	HPPG-SFU-TU108A-011	100	90.8
160-40590-23	HPPG-SFU-TU108A-021	99.9	92.0
LCS 160-490804/1-A	Lab Control Sample	80.9	93.8
MB 160-490804/22-A	Method Blank	102	92.7

### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier



## Environment Testing America

### ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40593-1  
Laboratory Sample Delivery Group: D1189452  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

---

Authorized for release by:  
4/12/2021 5:20:26 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

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*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

**Job ID: 160-40593-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

Narrative

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40593-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

## Job ID: 160-40593-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/27/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.1 C.

#### STRONTIUM-90 (GFPC)

Sample HPPG-SFU-TU108A-B-001 (160-40593-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 12/01/2020, prepared on 12/09/2020 and analyzed on 12/18/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU108A-B-001 (160-40593-1).

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-SFU-TU108A-B-001 (160-40593-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 12/01/2020, prepared on 12/03/2020 and analyzed on 12/24/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

#### Inferred from      Reported to Analyte

Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The replicate precision (RER) for Th-234/U-238 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances.  
(160-40595-A-5-C DU)

The method blank (MB) z-score associated with Prep Batch 160-490806 is within limits and is stored in the level IV raw data. (MB 160-490806/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-043

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APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520Project Manager: Lisa Bercik  
Phone #: (619)213-3389Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

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				Project Number: 501197		Analysis Requested							
				Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action									
				Project Location: San Francisco, CA									
				Purchase Order #: 1159058									
				Shipment/Pickup Date: 11/25/2020									
				Waybill Number: 495702256218									
				Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046									
Lab Contact Name/ph #				Gamma Spec (EPA 905 M0D)						Dose Rate	Evidence Bag ID	Comment	
				dry in growth gamma						uR/Hr			
				Preservatives (water)									
				Preservatives (soil)									
Sample ID	Date	Time	Method	Matrix	# of Containes	Container Type							
HPPG-SFU-TU108A-B-001	11/23/2020	16:33	G	SO	1	16 oz. plastic jar	X	X			4	DT189452	

Special Instructions:

21 day ingrowth results only

Turnaround Time: 3-day  10-Day  28-day  Other  Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By: Relinquisher Signature: Relinquish Date Time: Received By: Received Signature: Receive Date Time:

Lewis, Devin		11/23/2020 17:08	Locked Storage(Kevin Hoch)		11/23/2020 17:08
Locked Storage(Kevin Hoch)		11/25/2020 07:38	Devin Lewis		11/25/2020 07:38
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB		11/27/2020 09:12

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*

MICHA KORRIN HIZER



160-40593 Chain of Custody

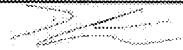
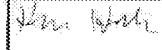


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# All Transfers for COC 501197RSY-043

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Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/23/2020 17:08	Locked Storage(Kevin Hoch)		11/23/2020 17:08
Locked Storage(Kevin Hoch)		11/25/2020 07:38	Devin Lewis		11/25/2020 07:38
Devin Lewis		11/25/2020 11:08	SHIPPEDTOLAB	 MICHA KORRINIZER	11/27/2020 09:12



ED\_006360A\_00000377-00091

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40593-1  
SDG Number: D1189452**Login Number:** 40593**List Source:** Eurofins TestAmerica, St. Louis**List Number:** 1**Creator:** Greer, Diane A

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

## Qualifiers

Rad Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
%	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

## Protocol References:

DOE = U.S. Department of Energy

EPA = US Environmental Protection Agency

None = None

## Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Eurofins TestAmerica, St. Louis

# Sample Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40593-1	HPPG-SFU-TU108A-B-001	Solid	11/23/20 16:33	11/27/20 09:12	

1  
2  
3  
4  
5  
6  
7  
8  
9  
10  
11  
12

Eurofins TestAmerica, St. Louis

# Client Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40593-1  
 SDG: D1189452

**Client Sample ID: HPPG-SFU-TU108A-B-001**
**Lab Sample ID: 160-40593-1**

Matrix: Solid

 Date Collected: 11/23/20 16:33  
 Date Received: 11/27/20 09:12

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.0276	U	0.139	0.139	0.331	0.117	pCi/g	12/09/20 18:42	12/18/20 20:18	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	88.4		40 - 110					12/09/20 18:42	12/18/20 20:18	1
Y Carrier	90.5		40 - 110					12/09/20 18:42	12/18/20 20:18	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.475		0.139	0.147		0.0407	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Actinium-227	0.0611	U	0.223	0.223		0.286	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Bismuth-212	0.316	U	0.636	0.636		0.497	pCi/g	12/03/20 12:24	12/24/20 07:13	1
<b>Bismuth-214</b>	<b>0.354</b>		0.108	0.114		0.0455	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Cesium-137	-0.0404	U	0.0682	0.0683	0.0700	0.0536	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Lead-210	0.993		1.11	1.12		0.859	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Lead-212	0.305		0.0674	0.0781		0.0326	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Lead-214	0.271		0.0910	0.0953		0.0435	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Potassium-40	9.77		1.26	1.60		0.250	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Protactinium-231	0.000	U	0.211	0.211		1.77	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Protactinium-234	0.0231	U	0.0455	0.0456		0.190	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Radium-226	0.354		0.108	0.114	0.200	0.0455	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Radium-228	0.475		0.139	0.147		0.0407	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thallium-208	0.125		0.0416	0.0436		0.0147	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thorium 228	0.305		0.0674	0.0781		0.0326	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thorium-232	0.475		0.139	0.147		0.0407	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Thorium-234	0.348	U	0.695	0.697		0.698	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Uranium-235	0.132	U	0.381	0.381		0.310	pCi/g	12/03/20 12:24	12/24/20 07:13	1
Uranium-238	0.348	U	0.695	0.697		0.698	pCi/g	12/03/20 12:24	12/24/20 07:13	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

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 Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

 Job ID: 160-40593-1  
 SDG: D1189452

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID:** MB 160-491323/23-A

**Matrix:** Solid

**Analysis Batch:** 492430

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 491323

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Strontium-90	0.07392	U	0.140	0.140	0.331	0.108	pCi/g	12/09/20 18:42	12/18/20 20:20	1
<b>Carrier</b>										
Sr Carrier	MB	MB	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac		
	100				40 - 110					
Y Carrier	92.7				40 - 110					

**Lab Sample ID:** LCS 160-491323/1-A

**Matrix:** Solid

**Analysis Batch:** 492430

**Client Sample ID:** Lab Control Sample  
**Prep Type:** Total/NA  
**Prep Batch:** 491323

Analyte	MB	MB	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec.Limits
	Result	Qualifier								
Strontium-90	7.76		7.76	5.897		0.638	0.331	0.109	pCi/g	76
<b>Carrier</b>										
Sr Carrier	MB	MB	%Yield	Qualifier	Limits	Prepared	Analyzed	Dil Fac		
	100				40 - 110					
Y Carrier	99.8				40 - 110					

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID:** MB 160-490806/1-A

**Matrix:** Solid

**Analysis Batch:** 492974

**Client Sample ID:** Method Blank  
**Prep Type:** Total/NA  
**Prep Batch:** 490806

Analyte	MB	MB	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Actinium 228	0.05721	U	0.116	0.116		0.0625	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Actinium-227	0.04285	U	0.0714	0.0716		0.259	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Bismuth-212	-0.006457	U	0.333	0.333		0.273	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Bismuth-214	0.001033	U	0.000924	0.000930		0.141	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Cesium-137	0.01744	U	0.0296	0.0297	0.0700	0.0211	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Lead-210	0.4198	U	0.929	0.931		0.732	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Lead-212	0.0009085	U	0.0512	0.0512		0.0416	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Lead-214	-0.02615	U	0.0747	0.0747		0.0630	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Potassium-40	0.3313		0.250	0.253		0.110	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Protactinium-231	0.0000	U	0.460	0.460		1.72	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Protactinium-234	0.03941	U	0.0812	0.0813		0.148	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Radium-226	0.001033	U	0.000924	0.000930	0.200	0.141	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Radium-228	0.05721	U	0.116	0.116		0.0625	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thallium-208	-0.03518	U	0.0689	0.0690		0.0361	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thorium 228	0.0009085	U	0.0512	0.0512		0.0416	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thorium-232	0.05721	U	0.116	0.116		0.0625	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Thorium-234	0.0000	U	0.109	0.109		0.573	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Uranium-235	0.0000	U	0.112	0.112		0.240	pCi/g	12/03/20 12:24	12/24/20 05:52	1
Uranium-238	0.0000	U	0.109	0.109		0.573	pCi/g	12/03/20 12:24	12/24/20 05:52	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-490806/2-A

Client Sample ID: Lab Control Sample

Matrix: Solid

Prep Type: Total/NA

Analysis Batch: 492975

Prep Batch: 490806

Analyte	Spike Added	LCS		Total		DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)	LOQ				
Americium-241	96.4	102.3		10.7		0.361	pCi/g	106	87 - 116
Cesium-137	26.7	26.88		2.90	0.0700	0.0857	pCi/g	101	87 - 120
Cobalt-60	9.43	9.636		1.04		0.0186	pCi/g	102	87 - 115

Eurofins TestAmerica, St. Louis

# QC Association Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

Rad

Leach Batch: 490609

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40593-1	HPPG-SFU-TU108A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 490806

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40593-1	HPPG-SFU-TU108A-B-001	Total/NA	Solid	Fill_Geo-21	490609
MB 160-490806/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-490806/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 491323

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40593-1	HPPG-SFU-TU108A-B-001	Total/NA	Solid	DPS-7	490609
MB 160-491323/23-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-491323/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

Eurofins TestAmerica, St. Louis

# Tracer/Carrier Summary

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40593-1  
SDG: D1189452

**Method: 905 - Strontium-90 (GFPC)**

Matrix: Solid

Prep Type: Total/NA

## Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40593-1	HPPG-SFU-TU108A-B-001	88.4	90.5
LCS 160-491323/1-A	Lab Control Sample	100	99.8
MB 160-491323/23-A	Method Blank	100	92.7

## Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier

Eurofins TestAmerica, St. Louis